**Description of the study programme – outline[[1]](#footnote-1)**

**Name of the higher education institution** Slovak University of Technology in Bratislava

**Address of the higher education institution** Vazovova 5, 812 43 Bratislava

**Identification number of the higher education institution** 702 0000 00

**Name of the faculty** Faculty of Chemical and Food Technology

**Address of the faculty** Radlinského 9, 812 37 Bratislava

Institution body for approving the study programme: Board for Internal System of Quality Assurance  
 at Slovak University of Technology in Bratislava

Date of the study programme approval or the study programme modification: dd.mm.yyy

Date of the latest change[[2]](#footnote-2) in the study programme description: new study programme

Reference to the results of the latest periodic review of the study programme by the institution: new study programme

Reference to the assessment report of the application for accreditation of the study programme under § 30 of Act no. 269/2018 Coll.[[3]](#footnote-3): new study programme

1. **Basic information about the study programme**
2. Name of the study program and its number according to the register of study programmes.

Process Control (Remedial)

1. Degree of higher education and ISCED-F education degree code.

1st degree, ISCED 665

1. Place(s) of delivery of the study programme.

Faculty of Chemical and Food Technology STU, Radlinského 9, 812 37 Bratislava

1. Name and number of the field of study in which higher education is obtained by completing the study programme, or a combination of two fields of study in which higher education is obtained by completing the study programme, ISCED-F codes of the field/fields[[4]](#footnote-4).

Cybernetics, 0714

1. Type of the study programme: academically oriented, professionally oriented; translation, translation combination study programme (listing the specializations); teaching, teaching combination study programme (listing the specializations); artistic, engineering, doctoral, preparation for regulated profession, joint study programme, interdisciplinary studies.

Bachelor

1. Awarded academic degree.

Bc.

1. Form of study[[5]](#footnote-5).

full-time

1. In the case of joint study programmes, cooperating institutions and the range of study obligations the student fulfills at each of the given institutions (§ 54a of the Act on Higher Education Institutions).

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1. Language or languages in which the study programme is delivered[[6]](#footnote-6).

English

1. Standard length of the study expressed in academic years.

Four years

1. Capacity of the study programme (planned number of students), the actual number of applicants and students.

We plan to admit a maximum of 10 students in the academic year 2021/22.  
The planned admittance for the academic year 2020/21 in the study program Automation, Information Engineering and Management in Chemistry and Food Industry, which is replaced by the study program Process Control, was 5 students. The actual number of applicants was 4 (out of which 4 applicants were from abroad), 0 were admitted, 0 are currently studying. (All this information is given in AIS STU)

1. **Graduate profile and learning objectives**
2. The institution defines the learning objectives of the study programme such as student's abilities at the time of completion of the programme and the main learning outcomes[[7]](#footnote-7).

A graduate of the bachelor study programme Process Control at FCFT, STU stands for a highly qualified expert with unique knowledge and skills reflecting modern trends in control, automation, informatization and digitization. During the study, the student engages in innovative project solutions to real technical problems, while gaining experience in the field of soft skills (work management and work planning, technical communication and presentation of results).He/she acquires the preconditions for independent and creative work in technological innovations and next-gen solutions. He will also gain invaluable contacts with industry practice and employers. The result is a highly sought-after graduate with seamless employment possibilities in the global labor market.

Knowledge:

A graduate of the study programme Process Control:

* has cross-sectional knowledge in the fields of cybernetics and chemistry with a focus on their application use corresponding to the current state of knowledge
* has knowledge of the course and kinetics of chemical phenomena occurring in the processes of chemical and food technology
* understands material and energy balances of chemical and food technology processes and masters chemical engineering calculations
* knows the principles of sensing physical quantities
* has an overview of the basic types of actuators and masters the principles of their functionality
* understands the basics of systems science and theory of dynamical systems and the way of their mathematical modeling and analysis
* masters the principles of creating mathematical models of basic types of chemical and food technology processes
* can formulate and mathematically describe material and energy balances for processes with substance accumulation, processes with heat transfer and processes with chemical reaction
* can mathematically describe the kinetics of chemical reactions, heat transfer and heat transfer can recognize and analyze static and dynamic properties of storage tanks, heat exchangers, mixers and chemical reactors
* knows and is capable of evaluation of the static and transient characteristics of chemical and food technology processes
* masters the basic principles of process identification from transient characteristics
* knows the indicators of control quality performance and can use them to compare several solutions
* can design logical and continuous controllers for chemical and food technology processes
* has basic knowledge of the operation of electronic platforms of microcontrollers, sensor circuits and control of physical systems
* can transform the task of optimization of chemical and food production into a mathematical optimization problem, can solve such problems and interpret the results of the solution
* can apply basic statistical methods to data management and parameter estimation
* masters the basics of creating technical documents in the LaTeX environment
* masters the basics of data science and machine learning
* masters the basics of technical and professional English
* masters the basics of economics and business management

Skills:

A graduate of the study program Process Control:

* can process data and create documents in computer office suites
* masters the basics of working in Windows and Linux operating systems
* can automate data processing using scripting in Linux and Windows operating systems
* can perform technical calculations focused on material and energy balances in the Matlab software environment
* can model the processes of chemical and food technology in the Simulink environment
* can create mathematical models of processes in the form of nonlinear state description, linear state description or transfer function and can implement and analyze these models in the Matlab / Simulink environment
* masters the basics of programming in the Python programming language
* has the ability to implement logic and continuous controllers on programmable logic controllers
* can work with physical sensors and actuators, program control logic at the lowest level, implement process data collection and processing
* can use Matlab software toolboxes
* can design and implement graphical user interfaces in the Matlab programming environment
* can process and evaluate measured data in Excel
* can create web pages using HTML, CSS and JavaScript technologies
* can process the results of their work in the form of technical reports and presentations and can communicate these effectively
* has managerial, economic, social, moral and environmental awareness and is able to prepare documents, reports and documentation in accordance with the professional, ethical and legal framework in force in the field of cybernetics with a focus on automation and informatization of processes
* is able to read the technical documents and assignments from the customer with understanding
* has the ability to develop technical documents to determine the most appropriate solution
* can combine the latest knowledge in the field of control, automation, optimization and informatization to solve a technical problem in order to obtain a solution with significant added value

Competencies:

A graduate of the study programme Process Control:

* is independent in solving professional tasks, projects and coordination of partial activities
* is able to independently and creatively solve complex projects, with regard to its professional focus
* can think analytically, present his/her own opinions and solutions to new and non-standard situations and understand the current state of technology
* is ready to work effectively in a team, cooperate and motivate people, take responsibility for team results
* can plan his/her own education, organize his/her work and acquire new knowledge independently
* can set a time plan for solving the project so as to minimize the cost component and adhere to the time plan of the employer or customer by applying modern approaches to working time planning and also with regard to other members of the work team
* is characterized by the ability to identify, quantify and evaluate the impact of problem solving on the society and environment
* can appropriately and professionally present his/her own opinions and technical solutions to different types of audiences at different levels of management

1. The institution indicates the professions for which the graduate is prepared at the time of completion and the potential of the study programme from the point of view of graduate's employability.

Indication of professions:

Graduate of the study programme Process Control:

* is ready for the 2nd degree university study and can, with the help of acquired knowledge and skills, directly continue the study in subsequent engineering study programs in the field of Cybernetics, but also Chemistry, Chemical Engineering and Technology, Food Technology, Biotechnology and others.
* is capable of employment as (according to the System of Occupations at sustavapovolani.sk): Process Technician in Chemical Production, Dispatcher in Chemical Industry, Quality Control Technician in Chemical Production, Chemical Technician in Industrial Production, Plastics Processing Technician, Chemical Technician in Industrial Production, Application Technician in Chemical Production, Dispatcher in Chemical Industry, Operator of Equipment in Biochemical Production, Operator of Machines and Equipment in Pharmaceutical Production, Operator of Remote Control of Chemical Production, Production Planning Specialist, Control Technician in Food Production, Information System Administrator, Database Administrator, ICT Tester, Project Manager in ICT, Application Programmer, System Programmer, Web Technician, ICT Sales Specialist, Technician in the Establishment and Operation of ICT Services, Signaling and Communication Systems Technician, PLC Programmer.

1. Relevant external stakeholders who have provided the statement or a favorable opinion on the compliance of the acquired qualification with the sector-specific requirements for the profession**[[8]](#footnote-8)**.

This is not the case of regulated professions.

1. **Employability**
2. Evaluation of the study programme graduates employability.

The Process Control study programme is the only study programme in the study field of Cybernetics focused on the application of control, automation and information technologies in the chemical, food and process industries and it is the only programme that provides interdisciplinary study in natural sciences - chemistry, mathematics and physics, chemical technologies, automation, information technology and optimization. The employability of graduates lies mainly in the chemical, process, petrochemical, food, pharmaceutical and paper industries, but also in interdisciplinary professions in the field of energy, electrical and mechanical engineering, i.e. wherever it is necessary to recognize the properties of operated processes and digitize, automate, optimize and control them so as to increase the economic efficiency and safety of their operation. In these areas, the graduate of the study programme Process Control will work as a project manager, designer, constructor, system designer, specialist in various types of companies and organizations, which use methods and means of automation, information and communication technologies and mathematical data processing and evaluation to improve their functioning. A graduate of this study programme is characterized by in-depth knowledge of material and energy balances of phenomena that take place in continuous and batch processes with mass and heat transfer, which, compared to graduates of other study programs in Cybernetics allows him/her to better understand the physical nature of these processes and use it to optimize them in order to reduce energy intensity, carbon footprint and overall environmental impact on the one hand and to increase the quantity and quality of production as well as overall labor productivity on the other hand. The graduate is characterized by in-depth knowledge of the course and kinetics of chemical reactions taking place in the processes of chemical and food technology, as well as their side effects on production and the environment. He masters various ways of measuring physical quantities and can process, analyze and evaluate these. The graduate is able to independently and as part of a team analyze technical problems, design solutions, implement digitization, automation, optimization and control algorithms and systems on process hardware, while being able to diagnose, to maintain, to manage and to further develop the existing systems. The graduate is able to apply the latest theoretical knowledge to solve practical problems, while being able to independently assess various solutions and choose the most effective one, which takes into account the benefit and costs. He/she can be employed in companies dealing with measurement, regulation, automation not only in the chemical and food industry, where knowledge of chemical and food technologies is an advantage for an effective work in these industries, but also in companies focused on computer technology, measurement and control technology, in development of Internet solutions not only in the chemical and food industry, but also in finance and banking, as a programmer in all sectors of the economy, as a middle management in chemical and food companies, in economic, sales, technical and human-resources departments and has the potential to be an entrepreneur in production and services focused primarily on chemical and food technologies.

1. If applicable, indicate the successful graduates of the study programme.

The study programme Process Control is a newly created study program and therefore it does not have any graduates yet. However, the study programme replaces the study program Automation, Information Engineering and Management in Chemistry and Food Industry, which has educated in 10 years of its existence a number of successful graduates who have succeeded in the commercial and academic fields. In the commercial field, it is possible to mention the following graduates: Ing. Ivana Hercegová (nee Rauová, year of master study graduation: 2010), Ing. Karol Ľubušký (2014) and Ing. Natália Mikušová (2017), all employees of Slovnaft a.s., member of the MOL group, Ing. Monika Bučková (Terneuzen; The Netherlands), Ing. Juraj Holaza, PhD. (2012) and Ing. Daniela Képešiová (nee Pakšiová, 2015), both Honeywell; CZ, Ing. Martin Mišenko - Volkswagen Slovakia (2017), Ing. Juraj Kukla - Innovatrics (2018), Ing. Bálint Takács, PhD. - Vertiv Co (2012), Ing. Jakub Jakabšic (2017), Ing. Jakub Nosko (2019) and Ing. Daniel Boroš (2019) - all SIEMENS, Ing. Linda Dvorštiaková (nee Hanulová, 2018) - Mondi SCP, and many others. Graduates in the academic and research fields are very successful as well - let us mention doc. Juraj Oravec, PhD. and Ing. Martin Klaučo, PhD., who are successfully established at the Slovak University of Technology in Bratislava, and especially Ing. Ján Drgoňa, PhD., who currently works at the Pacific Northwest National Laboratory in the USA.

1. Evaluation of the study programme quality by employers (feedback).

Employers positively evaluate the ability of the study programme graduates to creatively apply theoretical knowledge to solve specific technical problems and challenges in automation and digitization of industrial plants and processes, emphasizing the uniqueness of the proposed study programme as a programme that is the only one in the field of Cybernetics to directly prepare graduates to work in areas of the chemical, petrochemical and food industries, where a deep understanding of the chemical phenomena taking place in their operations is a necessary prerequisite for achieving economically efficient and at the same time safe operation. It is also emphasized by employers that the study programme Process Control emphasizes the inclusion of project-type courses, whether individual or group-based, which prepares them for the work in a team. Another positive side is the inclusion of courses in which graduates acquire soft skills, especially in the field of effective communication and presentation of their ideas, solutions, and results. The quality of the study programme would benefit from closer cooperation between the faculty and industrial partners so that students are already confronted during their studies with the challenges they will face in their future employment, ideally in the form of internships.

1. **Structure and content of the study programme[[9]](#footnote-9)**
2. *The institution describes the rules for the design of study plans within the study programme.*

The rules and conditions for the creation of study plans for students are described in the internal regulation Study Regulations of the Slovak University of Technology in Bratislava, as amended by Amendments no. 1 a 2. - in particular Article 11.  
<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/Uplne_znenie_Studijny_poriadok_STU_s_dodatok_1_a_2_EN_od_15.7.2020.pdf>

1. *The institution compiles the recommended study plans for individual study paths[[10]](#footnote-10).*

Overview study plan including all compulsory elective and elective courses of the study program:

<https://is.stuba.sk/dok_server/slozka.pl?id=215329;lang=en>

1. *The study plan generally states:*

* *individual parts of the study programme (modules, courses, and other relevant school and extracurricular activities, if they contribute to the achievement of the required learning outcomes and allow to obtain credits) in the structure of compulsory, compulsory optional and optional courses,*

The first two semester of the study programme Process Control (Remedial) are composed of mandatory faculty-wide classes that are devoted to providing students with introductory skills from interdisciplinary fields such as chemistry, physics, mathematics and informatics. In semesters number 3 to 8 does the study programme Process Control (Remedial) follow the recommended study plan of the 3-year study programme Process Control.

There are no fixed modules in the bachelor study programme Process Control. However, the student has the opportunity to profile himself/herself either in the direction of automation and process control, or in the direction of informatization and optimization of industrial operations through the choice of compulsory and elective courses. In both directions, common study courses at the Faculty of Chemical and Food Technology STU in Bratislava are defined in the study plan as compulsory courses, which will provide the student with fundamentals of chemical and physical phenomena taking place in chemical and food technology processes (Inorganic Chemistry, Physics, Mathematics, Mass balances, Physical Chemistry, Organic Chemistry, Chemical and Energetic Engineering), as well as compulsory courses, which mainly characterize the profile of the graduate of the study program Process Control (courses Tools of Technical Computing I and II, Dynamic Systems, Informatics I, Process Control I, Group Project, Optimization, Semestral Project, Process Control Project, Presentation skills I and II). Within the compulsory elective courses, students can then specialize either in the automation branch through the courses Modelling of Processes in Chemical and Food Technology, Logic Control, Process Control II or Parameter Estimation, or in the IT branch through the courses Programming I and II, Informatics II, Tools of Technical Computing III and IV, Database systems or Web technologies I and II. Students further supplement their study plans from a wide range of elective courses. The study programme Process Control places a strong emphasis on acquiring soft skills so that its graduates are prepared not only professionally but also personally and are significant assets for the employer. For this reason, the study plan includes the courses Presentation Skills I and II and the elective course Creation of Audiovisual Works. In these courses, students gain knowledge and skills to become effective communicators of their ideas and solutions. The Process Control study programme also emphasizes students' project work, whether individual or group-based. In the courses Semestral Project, Group Project and Process Control Project, students solve simulated practical tasks that reflect the needs of employers. The results of their work are applied to laboratory simulators, which are a scaled-down version of processes commonly used in industrial applications. Students will gain an idea of ​​the complexity of analysis, creation and implementation of information and control systems in real conditions. In addition, in the Group Project course, students work in a team, gaining soft skills in the appropriate division of labor reflecting the strengths and weaknesses of individual team members, mutual communication between group members, as well as group responsibility for the result.

* ***profile courses*** *of the relevant study path (specialization) within the study programme,*

The Process Control study programme is characterized by a thorough understanding of the principles and consequences of chemical and biochemical phenomena occurring in chemical and food technology processes, especially in the field of inorganic, organic and physical chemistry, as well as energy and mass balances and chemical engineering so that its graduates have acquired the ability to apply this knowledge in a creative and innovative way to the analysis, creation, maintenance and expansion of digitization, automation, optimization and control systems for such production processes. For this purpose, in addition to faculty-wide courses, the study program is designed to include three classes of courses:

1. professional courses of specialization providing students with theoretical and professional foundations of specialization of process control;
2. project-oriented courses, both individual and group-based;
3. courses for acquiring soft skills.

This is the base for the following primary selection of profile courses:

Profile professional courses:

* Tools of Technical Computing I - the student will learn the basics of using MATLAB software and can implement technical calculations focused on mass and energy balances, 3rd semester of the bachelor study
* Tools of Technical Computing II - the student will gain knowledge of using the MATLAB / Simulink software environment for a variety of practical applications used for modeling and simulation of dynamic processes, 4th semester of the bachelor study
* Informatics I - the student will gain knowledge about the principle of working with personal computers and the functionality of laboratory information systems, 2nd semester of the bachelor study
* Dynamic systems - the student will learn the basics of systems science and theory of dynamic systems, methods of their mathematical modeling and analysis, 4th semester of the bachelor study
* Process control I - the student understands the basics of modeling and process control of chemical and food technology and can design the parameters of simple controllers, 6th semester of the bachelor study
* Optimization - the student will gain knowledge in the field of formulation of optimization problems, in the field of improving the economic efficiency of industrial plants and productions, as well as algorithms and tools for solving these problems, 7th semester of the bachelor study

Profile project-oriented courses:

* Group Project - the student understands and applies methods and techniques for solving technical problems in the team, while acquiring soft skills such as division of labor, synchronization between several members of the team and group responsibility for the result and presentation of project results, 6th semester of the bachelor study
* Semestral Project - the student creatively applies knowledge to solve a simulated practical problem, which forms part of his/her subsequent bachelor thesis and presents the results of the project, 7th semester of the bachelor study
* Process Control Project - the student combines knowledge from various courses to create an information and control system for the selected process simulator, which is a faithful, albeit reduced, replica of the industrial process and presents the results of the project, 8th semester of the bachelor study

Profile courses for acquiring soft skills:

* Presentation skills I - the student will gain the basic knowledge necessary for the preparation of typographically high-quality final thesis, as well as for the preparation of posters, presentations and infographics, 6th semester of the bachelor study
* Presentation skills II - the student will acquire advanced knowledge from the preparation of typographically high-quality documents and presentations, learn the principles of creating presentations with technical and scientific content in the LaTeX environment, as well as the creation of technical schemes in vector graphic editors, 7th semester of the bachelor study
* *for each learning part/course the learning outcomes, related criteria and rules of their assessment so that the learning objectives of the study programme are met (they can be stated only in the Course information sheets, in the Learning outcomes section and in the Course completion requirements),*

Information available in the Course information sheets

* *prerequisites, co-requisites and recommendations for the design of the study plan,*

Information available in the Course information sheets

* *for each learning part of the study plan/course the applied educational activities (lecture, seminar, exercise, final work, project work, laboratory work, internship, excursion, field practice, professional practice, state exam, etc. or their combinations) suitable for achieving learning outcomes,*

Information available in the Course information sheets

* *methods by which the educational activity is delivered – present, distant, combined (in accordance with the Course information sheets),*

Information available in the Course information sheets

* *outline/syllabus of the course[[11]](#footnote-11),*

Information available in the Course information sheets

* *student workload ("extent" of individual courses and educational activities separately)[[12]](#footnote-12),*

Information available in the Course information sheets

* *credits allocated to each part based on the learning outcomes achieved and the workload involved,*

Information available in the Course information sheets

* *the person responsible for the course (or a partner organization/person[[13]](#footnote-13)) with an indication of the contact details,*

Information available in the Course information sheets

* *course teachers (or participating partner organizations/persons) (may also be mentioned in Course information sheets),*

Information available in the Course information sheets

* *places where the courses are taught (if the study programme is delivered at several workplaces).*

The teaching of all courses of the study programme Process Control takes place in the building of the Faculty of Chemical and Food Technology STU, Radlinského 9, 812 37 Bratislava.

1. *The institution states the number of credits, the achievement of which is a condition for proper completion of studies and other requirements that the student must meet within the study programme and for its proper completion, including the requirements for state examinations, rules for re-study and rules for the extension, interruption of study.*

To complete the study properly, it is necessary to obtain 240 credits. The student is admitted to the state exam, which consists of the defense of a bachelor thesis and a broader professional discussion, only if he/she successfully completes all compulsory courses and the prescribed number of compulsory elective courses and at the same time obtains at least 224 credits. Other rules are specified in the internal regulation Study Regulations of the Slovak University of Technology in Bratislava, as amended by Amendments no. 1 a 2. - in particular Article 22.  
<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/Uplne_znenie_Studijny_poriadok_STU_s_dodatok_1_a_2_EN_od_15.7.2020.pdf>

1. *For individual study plans, the institution states the requirements for completing the individual parts of the study programme and the student's progress within the study programme in the given structure:*

* *number of credits for compulsory courses required for proper completion of studies/completion of a part of studies,*

196

* *number of credits for compulsory optional courses required for the proper completion of studies/completion of a part of studies,*

22

* *number of credits for optional courses required for the proper completion of studies/completion of a part of studies,*

22

* *number of credits required for the completion of studies/completion of a part of the studies for the common foundations and for the relevant specialization, in the case of a teaching combination study programme or a translation combination study programme,*

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* *number of credits for the final thesis and the defense of the final thesis required for the proper completion of studies,*

15 credits for the bachelor thesis itself. Students work on the bachelor thesis for 2 semesters in the courses Semestral Project (7th semester) and Bachelor Thesis (8th semester), while they can obtain another 4 credits for the course Semestral Project.

* *number of credits for professional practice required for the proper completion of studies/completion of a part of studies,*

No internship is required during the study.

* *number of credits required for the proper completion of studies/completion of a part of the studies for project work with the indication of relevant courses in engineering study programmes,*

In addition to the elaboration and defense of the bachelor thesis (15 credits), the following courses summing up for ​​16 credits are devoted to the project work:

* Group project (6 credits), where students learn to work in a team, learning to divide the project into subtasks, then synchronize and combine them into a functional unit for which they have group responsibility, while the final solution must be defended by the team.
* Semestral project (4 credits), where the student works creatively on a project in which he/she uses the knowledge acquired so far to solve a specific technical problem.
* Process control project (6 credits), in which students combine knowledge from previously completed courses, while solving the practical task of design and implementation of computerization and control systems for the selected process simulator, which faithfully represents the process of chemical technology from real operation. Work on projects is also a part of many courses, the evaluation of which is linked to the elaboration and defense of projects (Logic Control, Programming I and II, Embedded Systems I and II, Tools of Technical Computing III) in the area of ​​at least another 12 credits.
* *number of credits required for the proper completion of studies/completion of a part of the studies for artistic performances in addition to the final thesis in art study programmes.*

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1. *The institution describes the rules for verification of learning outcomes, students assessment and the possibilities of appealing against the assessment.*

These rules are set out in the internal regulation of the Study Regulations of the Slovak University of Technology in Bratislava, as amended by Amendments no. 1 a 2. - in particular Articles 13, 7 and also Annex no. 1 .

<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/Uplne_znenie_Studijny_poriadok_STU_s_dodatok_1_a_2_EN_od_15.7.2020.pdf>

1. *Conditions for recognition of studies or a part of studies.*

At the request of a student who has previously studied at a university, the dean may recognize parts of his/her studies (academic year, semester, block of courses or individual courses) if no more than 5 years have elapsed since their completion. These rules are set out in the internal regulation of the Study Regulations of the Slovak University of Technology in Bratislava, as amended by Amendments no. 1 a 2. - Article 10, paragraph 7.

<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/Uplne_znenie_Studijny_poriadok_STU_s_dodatok_1_a_2_EN_od_15.7.2020.pdf>

1. *The institution states the topics of final theses of the study programme (or a link to the list).*

All final theses are reported in AIS.

Topics offered for bachelor's theses in the study programme Automation, Information Engineering and Management in Chemistry and Food Industry, which is replaced by the new study program Process Control - year of submission 2021:

* Modeling of laboratory distillation column in gPROMS ModelBuilder
* Control of systems by 'gain scheduling' method
* Design of fuzzy controllers in the Fuzzy Logic Toolbox Matlab environment
* Monitoring of temperatures of widely stored grains - feasibility
* Encrypted process control
* Design and implementation of control algorithms on an 8-bit microprocessor
* Digital twin of a heat exchanger
* Touchless device control with hand gestures
* Robotic system for searching for sources of surface water pollution
* Automatic detection of activation of electrical appliances
* Identification of elevated temperature of persons - testing with a low-budget thermal imaging
* Construction and programming of a robotic vehicle with omnidirectional wheels
* Monitoring of air quality in lecture rooms
* Motorized slider for camcorder
* Creation of educational facilities

1. *The institution describes or refers to:*

* *rules for the assignment, processing, opposition, defense and evaluation of final theses in the study programme,*

Internal regulation Study Regulations of the Slovak University of Technology in Bratislava, as amended by Amendments no. 1 a 2. - Article 18

<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/Uplne_znenie_Studijny_poriadok_STU_s_dodatok_1_a_2_EN_od_15.7.2020.pdf>

* *opportunities and procedures for participation in student mobility,*

International mobilities for students on the STU website

<https://www.stuba.sk/english/exchange-students/erasmus-outgoing/erasmus-study-stay.html?page_id=11073>

* *rules for adherence to academic ethics and rules for drawing consequences,*

Internal regulations regarding disciplinary proceedings

<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/nove_predpisy_2013/Disciplinarny_poriadok_STU_EN_2013.pdf>

<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/nove_predpisy_2013/Rokovaci_poriadok_dispiplinarnej_komisie_STU_EN_2013.pdf>

* *procedures applicable to students with special needs,*

Information for students with special needs

<https://www.stuba.sk/english/degree-students/students-and-applicants-with-special-needs.html?page_id=9108>

* *procedures for filing complaints and appeals by students.*

Internal regulation Study Regulations of the Slovak University of Technology in Bratislava as amended no. 1 a 2. - Articles 7 and 50

<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/Uplne_znenie_Studijny_poriadok_STU_s_dodatok_1_a_2_EN_od_15.7.2020.pdf>

1. **Course information sheets of the study programme**

*In the structure according to Decree no. 614/2002 Coll.*

<https://is.stuba.sk/dok_server/slozka.pl?id=215329;lang=en>

1. **Current academic year plan and current schedule** (or hyperlink).

Organization of the academic year

<https://www.stuba.sk/english/ects/ects-information-package/information-on-the-institution/academic-calendar.html?page_id=5446>

Study schedule

<https://www.fchpt.stuba.sk/sk/informacie-pre-studentov.html?page_id=284>

Timetable

<https://www.fchpt.stuba.sk/sk/informacie-pre-studentov/rozvrh-hodin.html?page_id=2199>

optionally in AIS.

1. **Persons responsible for the study programme**
2. A person responsible for the delivery, development, and quality of the study programme (indicating the position and contact details).

doc. Ing. Michal Kvasnica, PhD., associate professor,[**michal.kvasnica@stuba.sk**](mailto:michal.kvasnica@stuba.sk)

1. List of persons responsible for the profile courses of the study programme with the assignment to the course and provided with a link to the central Register of university staff and with contact details (they may also be listed in the study plan).

doc. Ing. Michal Kvasnica, PhD., [**https://www.portalvs.sk/regzam/detail/13693**](https://www.portalvs.sk/regzam/detail/13693)**,** [**michal.kvasnica@stuba.sk**](mailto:michal.kvasnica@stuba.sk), provides profile course Optimization

doc. Ing. Monika Bakošová, CSc.,[**https://www.portalvs.sk/regzam/detail/13532**](https://www.portalvs.sk/regzam/detail/13532)**,** [**monika.bakosova@stuba.sk**](mailto:monika.bakosova@stuba.sk), provides profile courses Group Project

prof. Ing. Miroslav Fikar, DrSc.,[**https://www.portalvs.sk/regzam/detail/13525**](https://www.portalvs.sk/regzam/detail/13525)**,** [**miroslav.fikar@stuba.sk**](mailto:miroslav.fikar@stuba.sk), provides profile courses Informatics I a Tools of Technical Computing I

doc. Ing. Juraj Oravec, PhD.,[**https://www.portalvs.sk/regzam/detail/16031**](https://www.portalvs.sk/regzam/detail/16031)**,** [**juraj.oravec@stuba.sk**](mailto:juraj.oravec@stuba.sk)**,** provides profile courses Process Control I, Proces Control Project and Tools of Technical Computing II

doc. Ing. Radoslav Paulen, PhD.,[**https://www.portalvs.sk/regzam/detail/18975**](https://www.portalvs.sk/regzam/detail/18975)**,** [**radoslav.paulen@stuba.sk**](mailto:radoslav.paulen@stuba.sk), provides profile courses Dynamic systems and Semestral Project

Ing. Martin Klaučo, PhD.,[**https://www.portalvs.sk/regzam/detail/22220**](https://www.portalvs.sk/regzam/detail/22220)**,** [**martin.klauco@stuba.sk**](mailto:martin.klauco@stuba.sk), provides profile courses Presentation skills I and II

1. Reference to the research/art/teacher profiles of persons responsible for the profile courses of the study programme.

<https://is.stuba.sk/auth/dok_server/slozka.pl?ds=1;id=215235;lang=en>

1. List of teachers of the study programme with the assignment to the course and provided with a link to the central Register of university staff and with contact details (may be a part of the study plan).

Teachers of the workplace, which provides the study programme Process Control:

* doc. Ing. Michal Kvasnica, PhD., docent, <https://www.portalvs.sk/regzam/detail/13693>, [michal.kvasnica@stuba.sk](mailto:michal.kvasnica@stuba.sk), besides the profile course Optimization, he provides courses Logic Control, Programming I and II, Data Structures and Algorithms, Introduction to the Julia Language, Introduction to Optimal and Predictive control, Process Control Seminar
* doc. Ing. Monika Bakošová, CSc., docent, <https://www.portalvs.sk/regzam/detail/13532>, [monika.bakosova@stuba.sk](mailto:monika.bakosova@stuba.sk), provides profile courses Group Project and courses Modelling of Processes in Chemical and Food Technology and Process Control II
* prof. Ing. Miroslav Fikar, DrSc., profesor, <https://www.portalvs.sk/regzam/detail/13525>, [miroslav.fikar@stuba.sk](mailto:miroslav.fikar@stuba.sk), provides profile courses Informatics I and Tools of Technical Computing I and courses Informatics II and Database Systems
* doc. Ing. Juraj Oravec, PhD., docent, <https://www.portalvs.sk/regzam/detail/16031>, [juraj.oravec@stuba.sk](mailto:juraj.oravec@stuba.sk), provides profile courses Process Control I, Process Control Project and Tools of Technical Computing II and course Distributed version control system
* doc. Ing. Radoslav Paulen, PhD., docent, <https://www.portalvs.sk/regzam/detail/18975>, [radoslav.paulen@stuba.sk](mailto:radoslav.paulen@stuba.sk), provides profile courses Dynamic Systems and Semestral Project and courses Tools of Technical Computing III, Parameter Estimation and Computer-based Simulation
* Ing. Martin Klaučo, PhD. <https://www.portalvs.sk/regzam/detail/22220>, [martin.klauco@stuba.sk](mailto:martin.klauco@stuba.sk), provides profile courses Presentation skills I and II and course Introduction to machine learning
* Ing. Martin Kalúz, PhD., <https://www.portalvs.sk/regzam/detail/16030>, [martin.kaluz@stuba.sk](mailto:martin.kaluz@stuba.sk), provides courses zabezpečuje predmety Electrical Engineering, Embedded Systems I and II and Production of Audiovisual Works
* Ing. Ľuboš Čirka, PhD., <https://www.portalvs.sk/regzam/detail/13582>, [lubos.cirka@stuba.sk](mailto:lubos.cirka@stuba.sk), provides courses Introduction to the R Language and Spreadsheet and Database Systems for Data Processing
* Ing. Richard Valo, PhD., <https://www.portalvs.sk/regzam/detail/13277>, [richard.valo@stuba.sk](mailto:richard.valo@stuba.sk), provides courses Operating Systems I and II and Industrial Technologies
* Mgr. Ľubomíra Horanská, PhD., <https://www.portalvs.sk/regzam/detail/13564>, [lubomira.horanska@stuba.sk](mailto:lubomira.horanska@stuba.sk), provides course Applications of Differential Equations
* doc. RNDr. Zdenko Takáč, PhD., docent, <https://www.portalvs.sk/regzam/detail/7943>, [zdenko.takac@stuba.sk](mailto:zdenko.takac@stuba.sk), provides courses Tools of Technical Computing IV and Introduction to Fuzzy Systems
* RNDr. Naďa Krivoňáková, PhD., <https://www.portalvs.sk/regzam/detail/10062>, [nada.krivonakova@stuba.sk](mailto:nada.krivonakova@stuba.sk), provides courses Combinatorial Methods in Chemistry and Biochemistry
* doc. RNDr. Milan Jasem, CSc., <https://www.portalvs.sk/regzam/detail/13515>, [milan.jasem@stuba.sk](mailto:milan.jasem@stuba.sk), provides course Mathematics I
* doc. RNDr. Vladimír Baláž, CSc., docent, <https://www.portalvs.sk/regzam/detail/13486>, [vladimir.balaz@stuba.sk](mailto:vladimir.balaz@stuba.sk), provides courses Seminar of Mathematics and Mathematics II

Teachers of faculty-wide compulsory and compulsory elective courses:

* prof. Ing. Marian Koman, DrSc., profesor, <https://www.portalvs.sk/regzam/detail/13438>, [marian.koman@stuba.sk](mailto:marian.koman@stuba.sk), provides course Inorganic Chemistry
* Mgr. Magdaléna Horáková, <https://www.portalvs.sk/regzam/detail/13586>, [magdalena.horakova@stuba.sk](mailto:magdalena.horakova@stuba.sk), provides courses Technical English I and II
* doc. Dr. Ing. Milan Majerník, docent, <https://www.portalvs.sk/regzam/detail/13663>, [milan.majernik@stuba.sk](mailto:milan.majernik@stuba.sk), provides course General Theory of Economy
* prof. Ing. Ľudovít Jelemenský, DrSc., profesor, <https://www.portalvs.sk/regzam/detail/13585>, [ludovit.jelemensky@stuba.sk](mailto:ludovit.jelemensky@stuba.sk), provides course Chemical and Energetic Engineering
* doc. Ing. Katarína Hroboňová, PhD., docent, <https://www.portalvs.sk/regzam/detail/13590>, [katarina.hrobonova@stuba.sk](mailto:katarina.hrobonova@stuba.sk), provides courses Instrumental Methods in Analysis and Laboratory of Instrumental Methods in Analysis
* doc. Ing. Pavol Steltenpohl, PhD., docent, <https://www.portalvs.sk/regzam/detail/13575>, [pavol.steltenpohl@stuba.sk](mailto:pavol.steltenpohl@stuba.sk), provides courses Fundamentals of Material balances and Laboratory of Chemical and Energetic Engineering
* Ing. Rastislav Šípoš, PhD., <https://www.portalvs.sk/regzam/detail/13650>, [rastislav.sipos@stuba.sk](mailto:rastislav.sipos@stuba.sk), provides course Seminar of Chemistry
* prof. Ing. Vladimír Lukeš, DrSc., profesor, <https://www.portalvs.sk/regzam/detail/13576>, [vladimir.lukes@stuba.sk](mailto:vladimir.lukes@stuba.sk), provides course Physics I
* doc. Ing. Pavol Fedorko, PhD., docent, <https://www.portalvs.sk/regzam/detail/13489>, [pavol.fedorko@stuba.sk](mailto:pavol.fedorko@stuba.sk), provides course Physics II
* doc. Ing. Dana Dvoranová, PhD., docent, <https://www.portalvs.sk/regzam/detail/13622>, [dana.dvoranova@stuba.sk](mailto:dana.dvoranova@stuba.sk), provides course Physical Chemistry I
* prof. Ing. Anton Gatial, DrSc., profesor, <https://www.portalvs.sk/regzam/detail/13434>, [anton.gatial@stuba.sk](mailto:anton.gatial@stuba.sk), provides course Physical Chemistry II
* prof. Ing. Štefan Marchalín, DrSc., profesor, <https://www.portalvs.sk/regzam/detail/13502>, [stefan.marchalin@stuba.sk](mailto:stefan.marchalin@stuba.sk), provides course Organic Chemistry I
* doc. Ing. Peter Szolcsányi, PhD., docent, <https://www.portalvs.sk/regzam/detail/13584>, [peter.szolcsanyi@stuba.sk](mailto:peter.szolcsanyi@stuba.sk), provides course Organic Chemistry II
* Ing. Jaroslava Maroszová, PhD., <https://www.portalvs.sk/regzam/detail/13642>, [jaroslava.maroszova@stuba.sk](mailto:jaroslava.maroszova@stuba.sk), provides course Laboratory of Inorganic Chemistry
* Ing. Július Annus, <https://www.portalvs.sk/regzam/detail/13528>, [julius.annus@stuba.sk](mailto:julius.annus@stuba.sk), provides course Laboratory of Physics
* doc. Ing. Erik Klein, PhD., docent, <https://www.portalvs.sk/regzam/detail/13583>, [erik.klein@stuba.sk](mailto:erik.klein@stuba.sk), provides courses Laboratory of Physical Chemistry I and II
* Mgr. Robin Pělucha, PhD., <https://www.portalvs.sk/regzam/detail/13719>, [robin.pelucha@stuba.sk](mailto:robin.pelucha@stuba.sk), provides courses Physical Education

1. List of the supervisors of final theses with the assignment to topics (indicating the contact details).

All information is also available in AIS. Contacts for trainers are given above.

Past theses from the study programme Automation, Information Engineering and Management in Chemistry and Food Industry, which is replaced by the study programme Process Control (year of defense 2020):

doc. Ing. Michal Kvasnica, PhD. - Digital twin of a heat exchanger

doc. Ing. Michal Kvasnica, PhD. - Predictive data analytics using machine learning

doc. Ing. Monika Bakošová, CSc. - Modeling and control of a biochemical reactor for ethanol production

doc. Ing. Monika Bakošová, CSc. - Modeling and control of fermentation process for ethanol production

Ing. Martin Kalúz, PhD. - Photovoltaic panel with automatic rotation behind the light source

Ing. Ľuboš Čirka, PhD. - Web application for data input and processing

Ing. Martin Klaučo, PhD. - Modeling and control of chemical reactors with variable reaction rate

Ing. Anna Vasičkaninová, PhD., <https://www.portalvs.sk/regzam/detail/13541>, [anna.vasickaninova@stuba.sk](mailto:anna.vasickaninova@stuba.sk) - Robust control of SISO systems

Current theses (year 2021):

doc. Ing. Michal Kvasnica, PhD. - Design and implementation of control algorithms on an 8-bit microprocessor

doc. Ing. Radoslav Paulen, PhD. - Modeling of laboratory distillation column in gPROMS ModelBuilder

Ing. Martin Klaučo, PhD. - Touchless device control with hand gestures

Ing. Martin Klaučo, PhD. - Monitoring of air quality in lecture rooms

Ing. Richard Valo, PhD. - Identification of elevated temperature of persons - testing with a low-budget thermal imager

Ing. Richard Valo, PhD. - Construction and programming of a robotic vehicle with omnidirectional wheels

Ing. Martin Kalúz, PhD. - Motorized slider for camcorder

1. Reference to the research/art/teacher profiles of the supervisors of final theses.

<https://is.stuba.sk/auth/dok_server/slozka.pl?ds=1;id=215235;lang=en>

1. Student representatives representing the interests of students of the study programme (name and contact details).

Patrik Valábek, [**xvalabek@stuba.sk**](mailto:xvalabek@stuba.sk)– 3rd year of bachelor study

Bc. Marek Wadinger, [**xwadinger@stuba.sk**](mailto:xwadinger@stuba.sk) – 1st year of master study

1. Study advisor of the study programme (indicating contact details and information on the access to counseling and on the schedule of consultations).

In addition to the guarantor, doc. Ing. Michala Kvasnica, Ph.D., doc. Ing. Juraj Oravec, Ph.D. and Ing. Martin Klaučo, Ph.D. have the roles of study advisors of the study programme Process Control. Contacts are listed above. Consultation hours are not fixed.

1. Other supporting staff of the study programme – assigned study officer, career counselor, administration, accommodation department, etc. (with contact details).

* Mgr. Eva Danášova, [eva.danasova@stuba.sk](mailto:eva.danasova@stuba.sk), study advisor for bachelor study
* Mgr. Ľubomíra Horanská, PhD., [lubomira.horanska@stuba.sk](mailto:lubomira.horanska@stuba.sk), secretary of Institute of Information Engineering, Automation and Mathematics at FCFT STU, who deals with pedagogy and study matters
* prof. Ing. Miloslav Drtil, PhD., [miloslav.drtil@stuba.sk](mailto:miloslav.drtil@stuba.sk), vice-dean for international relations, mobilities, public relations and faculty propagation, faculty Erasmus+ coordinator
* PhDr. Mariena Bartúnková, [mariena.bartunkova@stuba.sk](mailto:mariena.bartunkova@stuba.sk), university coordinator for students with special needs

1. **Spatial, material, and technical provision of the study programme and support**
2. List and characteristics of the study programme classrooms and their technical equipment with the assignment to learning outcomes and courses (laboratories, design and art studios, studios, workshops, interpreting booths, clinics, priest seminaries, science and technology parks, technology incubators, school enterprises, practice centers, training schools, classroom-training facilities, sports halls, swimming pools, sports grounds).

The 1st degree study programme Process Control is provided primarily in the teaching premises of the Institute of Information Engineering, Automation and Mathematics (UIAM) at FCFT STU in Bratislava <https://www.uiam.sk>. Lectures, exercises and laboratory exercises of faculty-wide courses are provided in the lecture halls, classrooms and laboratories of the faculty. For the purpose of teaching and research in the field of process control, the Institute of Information Engineering, Automation and Mathematics has built modern lecture rooms provided with audiovisual equipment (projector, screen, magnetic board, camera system for recording lectures), as well as several specialized laboratories and computer rooms, enabling to teach courses in all forms of study and implementation of research tasks in the field of control, automation and informatization of industrial processes. These laboratories are built mainly from the institute's internal grant budget, with the majority undergoing a comprehensive reconstruction in the last 2 years (replacement of wiring, installation of new lighting, equipment with modern instruments and equipment). In addition to lecture rooms and laboratories, students have their own student room, which they can use for relaxation, preparation or discussion with colleagues.

Specialized laboratories at the Institute of Information Engineering, Automation and Mathematics:

* Computing laboratories 638 and 693 for the implementation of exercises in the courses Tools of Technical Computing I to IV, Programming I and II, Web Technologies I and II, Informatics I and II, Computer-based Simulation, Operating Systems I and II, Database Systems, Distributed Revision Control System, Introduction to Optimal and Predictive Control, Introduction to the Julia language and Parameter Estimation
* Laboratory of Logic Control 640 for the implementation of exercises in the courses Logic Control, Process Control Project, Semestral Project, Bachelor Thesis, Group Project
* Laboratory of Process Control 636 for the implementation of exercises in the courses Process Control I and II, Process Control Project, Semestral Project, Bachelor Thesis, Group Project
* Laboratory of Embedded Systems 637 for the implementation of exercises in the courses Embedded Systems I and II, Process Control Project, Semestral project, Bachelor Thesis, Group Project
* Audiovisual studio for the implementation of exercises in the course Creation of Audiovisual Works

Computer laboratories are equipped with modern computer technology, while students are provided with university-wide licenses for Matlab/Simulink software with all its toolboxes, as well as specialized software for controlling process simulators. The process control laboratory is equipped with three of these simulators - a simulator of a rectification floor column, a chemical reactor and a pasteurization line. These devices are scaled-down but faithful replicas of the processes commonly used in the field of chemical and food technology and allow students to gain practical experience in industrial process control during their bachelor studies. The logic control laboratory is equipped with industrial logic controllers from Siemens and B&R Automation, i.e. students work directly with hardware and software, which is most often used in automation practice. The embedded systems laboratory has several stations equipped with microcomputers based on Arduino and Raspberry Pi, which are supplemented by various types of sensors and actuators. The modern audiovisual studio has a professional camera, lighting, sound system and key screen and allows students to prepare attractive audiovisual presentations of their works. A 3D printer with utility software is also available to students.

1. Characteristics of the study programme information management (access to study literature according to Course information sheets, access to information databases and other information sources, information technologies, etc.).

In terms of information security, the study programme Process Control is at a high level. First of all, all lectures and exercises taught by the department, which provides this study programme, are recorded in the form of videos, which are made available to students using the e-learning system Moodle (<https://moodle.uiam.sk>) and the Youtube portal. This gives students the opportunity to look at the teaching activity repeatedly, either in preparation for the exercise or for the exam. The Moodle system is also used to make the study literature accessible, either in the form of links or by directly saving the electronic version of the resource. The study literature is supplemented by various forms of supporting study materials, e.g. in the form of non-binding online tests, with which the student verifies his/her readiness for the exercise before participating.

Thanks to the university-wide (nation-wide) licenses, the student have free access to many scientific and technical databases containing scientific works and electronic versions of books and textbooks (Taylor & Francis, IOP SCIENCE, STN online, ACS Publications, Detail Inspiration, Web of Science, ScienceDirect, SCOPUS, IEEE Xplore, Springer, Springer Link , Wiley). Students have access to another large collection of study literature through the Slovak Chemical Library located at the FCFT STU in Bratislava, either in the form of borrowing or studying the literature in the comfortable premises of the library. In addition, the library provides a wide range of electronic services: printing of final theses and posters, publishing services or working cloud storage for data storage. A more important utility for students is also access to digitized study materials using a web browser from a personal or library computer, tablet or mobile phone via the eBooks service (<https://ebooks.fchpt.stuba.sk>). The archive contains more than 200 digitized versions of study texts, scripts and textbooks covering almost all courses listed in the study programme Process Control.

To access the Internet, students of the Faculty of Chemical and Food Technology have access to a wireless connection via the Eduroam WiFi network, while the coverage of this network is constantly expanding. At the faculty, personal computers intended for the study of digitized study literature are available to students in the premises of the Slovak Chemical Library. The faculty is currently building a fast optical network with a transmission speed of up to 10 Gbit/s with a connection to the metropolitan SANET network with a speed of up to 40 Gbit/s. This makes FCFT one of the workplaces with top equipment in the field of ICT. In the premises of the Institute of Information Engineering, Automation and Mathematics (IIAM), which provides the study programme Process Control, students have two laboratories equipped with computer technology, where students can perform not only computational exercises, but also preparation for exercises or evaluation of results. In addition, students have their own student room equipped with magnetic boards, where they can relax, prepare for scheduled activities or consult with their colleagues. There are also two network printers (one color and one up to A3), two photocopiers and a scanner available at the IIAM premises. In the corridors of the IIAM there are electronic information boards, which inform students about news about the life of the IIAM, news from the scientific field of control and automation and they show educational and popularization materials. Most of the teachers' rooms are equipped with electronic name tags, which provide students with information about the current workload of the teacher.

1. Characteristics and extent of distance education applied in the study programme with the assignment to courses. Access, manuals of e-learning portals. Procedures for the transition from contact teaching to distance learning.

The study programme Process Control is primarily taught in the full-time form, with the possibility of the distance form for selected pedagogical activities (e.g. submission of assignments or work on assignments dedicated to information technologies). In the event of an emergency situation (e.g. due to the occurrence of COVID-19), it is possible to implement most courses in a fully distance form, as was the case in the academic years 2019/2020 and 2020/2021. This is facilitated by the significant electronization of the courses of the study programme, while most of them have a secured electronic course in the e-learning system Moodle (moodle.uiam.sk), through which students have access to presentation slides from lectures (PDF or Powerpoint formats), assignments, study material, interactive tutorials and, to a large extent, video recordings of all lectures and exercises. The Moodle system also serves the students for an electronic transmission of protocols from exercises. The system allows teachers to check and to evaluate the protocols. Other videos from the lectures are also available through the Youtube platform. It is also necessary to emphasize that the Moodle system is also used to test and examine students in the form of interactive tests with various forms of asking the questions (choosing from options or adding a text answer or formula). The evaluation of answers is fully automated, which brings three key benefits: 1. immediate feedback for the student (which is especially important in the entrance tests at the beginning of the exercise), 2. relieving the teacher of manual evaluation, and 3. objectivity of evaluation. Test results are automatically recorded with subsequent automatic calculation of the evaluation at the end of the semester. Some courses also use the STU Academic Information System for file storage and evaluation. The rules for the transition to the distance form are regulated by the Study Regulations of the Slovak Technical University in Bratislava, as amended by Amendments no. 1 and 2. - Article 18.

<https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/Uplne_znenie_Studijny_poriadok_STU_s_dodatok_1_a_2_EN_od_15.7.2020.pdf>

During the emergency situation caused by COVID-19, all courses were realized in a distance form via the Google Meet platform. All scheduled activities (i.e. lectures and exercises) were recorded and continuously made available to students in the form of links in the Moodle system. Such a procedure was very positively appreciated by the students, as it allows them to look at a specific schedule activity repeatedly in case they did not understand the lectured/practiced material directly during the lessons. In the case of computational exercises, these were carried out by live consultations with the teacher in the form of screen sharing, during which the teacher helped students to diagnose errors in the computer programs. The Jupyter system (<http://jupyter.uiam.sk>) was also successfully used, which is used for interactive programming in various programming languages ​​(C/C++, Python, Julia, R and others) in the convenient form via a web browser. However, the big challenge of distance teaching is represented in the exercises, where students have to work either with laboratory equipment or with hardware components. During the extraordinary COVID-19 situation, this was solved by lending hardware to students with subsequent consultations in the virtual space. In the future, a complete digitization of laboratory exercises is planned in the form of creating their digital replicas in the concept of digital twins. It will be a virtual replacement of laboratory experiments, either in the form of simulations in a web browser, or in the form of remote control of laboratory equipment supplemented by video transmission.

1. Institution partners in providing educational activities for the study programme and the characteristics of their participation.

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1. Characteristics of the possibilities for social, sports, cultural, spiritual and social activities.

Student associations

**https://www.stuba.sk/english/ects/ects-information-package/general-information-for-students/student-associations.html?page\_id=5448**

Student life

**https://www.stuba.sk/sk/studenti/studentsky-zivot.html?page\_id=9285**

Student association CHEM

[**https://www.fchpt.stuba.sk/sk/informacie-pre-studentov/studentsky-spolok-chem.html?page\_id=4422**](https://www.fchpt.stuba.sk/sk/informacie-pre-studentov/studentsky-spolok-chem.html?page_id=4422)

Magazine Radikál:

[**https://www.fchpt.stuba.sk/sk/informacie-pre-studentov/studentsky-spolok-chem/casopis-radikal.html?page\_id=4426**](https://www.fchpt.stuba.sk/sk/informacie-pre-studentov/studentsky-spolok-chem/casopis-radikal.html?page_id=4426)

STUBA Green Team

**https://sgteam.eu/**

Beánia (student ball)

[**https://www.beania.sk/**](https://www.beania.sk/)

Folklore group Technik

**https://www.stuba.sk/sk/ucelove-zariadenia/vysokoskolsky-umelecky-subor-technik.html?page\_id=675**

University pastoral centre in Mlynská dolina

[**https://www.upc.uniba.sk/**](https://www.upc.uniba.sk/)

1. Possibilities and conditions for participation of the study programme students in mobilities and internships (indicating contact details), application instructions, rules for recognition of this education.

International mobility for students on the STU website

[**https://www.stuba.sk/english/exchange-students/erasmus-outgoing/erasmus-study-stay.html?page\_id=11073**](https://www.stuba.sk/english/exchange-students/erasmus-outgoing/erasmus-study-stay.html?page_id=11073)

Study abroad

[**https://www.fchpt.stuba.sk/sk/informacie-pre-studentov/erasmus.html?page\_id=3642**](https://www.fchpt.stuba.sk/sk/informacie-pre-studentov/erasmus.html?page_id=3642)

1. **Required abilities and admission requirements for the study programme applicants**
2. Required abilities and necessary admission requirements.

An applicant for the study programme must meet the basic conditions for admission to study set by law. Prerequisites for successful completion of the study programme are knowledge from the courses of the bachelor study at the core of the study field of Cybernetics.

1. Admission procedures.

Rules and conditions of admission to the study of first, second and third degree study programs at STU

[**https://www.stuba.sk/english/degree-students/admission-procedure-application-forms-deadlines-fees-contacts-students-guide.html?page\_id=2020**](https://www.stuba.sk/english/degree-students/admission-procedure-application-forms-deadlines-fees-contacts-students-guide.html?page_id=2020)

Admission procedure for bachelor studies for the academic year 2021/2022

[**https://www.fchpt.stuba.sk/english/information-for-applicants/bachelor-degree-study.html?page\_id=2953**](https://www.fchpt.stuba.sk/english/information-for-applicants/bachelor-degree-study.html?page_id=2953)

1. Results of the admission process over the last period.

The results of the admission procedure are listed in the AIS.

As the study programme Process Control is a newly proposed study programme, we present the results of the admission procedure for the previous study programme Automation, Information Engineering and Management in Chemistry and Food Industry. These are listed for 2020 in the following table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Faculty | Study type | Study programme as in the application | | Phase | Applicants | | | |
| Study field | Name | SR | Abroad | Total | Female |
| FCFT | bachelor | Cybernetics | B-AIMCHP Automation, Information Engineering and Management in Chemistry and Food Industry | 1 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Study programme as per admission | | Place of study | Form of study | Admitted w/o admission exam | | | |
| Study field | Acronym | SR | Abroad | Total | Female |
| Cybernetics | B-AIMCHP Automation, Information Engineering and Management in Chemistry and Food Industry | Bratislava | full-time | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Applicants passing the admission exam | | | | Applicants admitted according the admission exam | | | | Applicants admitted by rector | | | | Students starting the study | | | |
| SR | Abroad | Total | Female | SR | Abroad | Total | Female | SR | Abroad | Total | Female | SR | Abroad | Total | Female |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

1. **Feedback on the quality of provided education**
2. Procedures for monitoring and evaluating students' opinions on the study programme quality.

The study programme Process Control places great emphasis on the collection, evaluation and positive response to the feedback from students. This is done in two ways: continuously after each scheduled activity via the webpage of the department that provides the study programme, and centrally using procedures defined by the university.

Continuous monitoring and evaluation of students' opinions are carried out through web surveys on the webpage of the department, which provides the study programme Process Control ([www.uiam.sk](http://www.uiam.sk)). In the teaching timetable, the student can express his/her opinion weekly on every scheduled activity by answering three simple questions:

1. Evaluate the comprehensibility and adequacy of the curriculum on a scale of 1 to 5
2. Rate the approach and reading of the teacher on a scale from 1 to 5
3. Verbal praise or constructive criticism

The results of these surveys are immediately available to individual teachers and guarantors of the corresponding courses, who have the opportunity to respond immediately to possible issues in the teaching process. Since its introduction, the ongoing monitoring has met with a very positive response from students, who welcome teachers' interest in their views and take their comments into account, with the opportunity to assess not only the course at the end of the semester but individual teaching activities as soon as they are realized.

The central monitoring of students' opinions is governed by the STU Internal Quality System, which was approved as an internal STU regulation in the STU Academic Senate on 28 April 2014. The internal quality system creates a formal framework for implementing assessment and management activities in education at various levels.

When evaluating the quality of the educational process, feedback from students is important. The involvement of students in this process is realized in several ways:

* commenting on the quality of education and teachers, respectively to other matters of study at the faculties through anonymous evaluation,
* expressing opinions, suggestions, through the Black Box,
* filing complaints,
* formal and informal meetings of students with the management structures of the educational process from the guarantors of study programmes to the management of the faculty,
* representation of students in the bodies of academic self-government, namely in the academic senate of the faculty and the university, the disciplinary commission of the faculty and participation in the meetings of the dean's board,
* by participating in the preparation, discussion and approval of materials and internal regulations in the field of education,
* mutual support of students, especially in the form of tutoring organized through student coaching.

In accordance with § 70 section 1 letter h) of the Act on Higher Education, students of the faculty have the right to comment on the quality of teaching in the form of an anonymous questionnaire. Students of STU can use this right through questionnaires in AIS, in which students' satisfaction with the quality of teaching of the courses is monitored individually. The assessment is automatically made available to all students who studied the course in the observed period and had been registered for the course in the AIS; participation in the evaluation is voluntary. Questionnaires are always evaluated at the end of the semester.

1. Results of student feedback and related measures to improve the study programme quality.

The results of the continuous collection of student feedback using the above-mentioned surveys after each scheduled activity are immediately available after completion to course teachers and course guarantors. The course guarantor continuously monitors the evaluation of teachers who teach the course guaranteed by him/her and responds to the evaluation accordingly by issuing guidelines or by consulting on how to respond to reservations (but also praise) from students. Of course, there are also personal consultations of teachers with students, during which teachers are interested in the opinion of students and they discuss with them their comments, reservations, but also positive feedback. The result is a strengthening of the student-teacher relationship, which is a necessary prerequisite for the education of the graduate, who is educated not only in terms of professional and technical, but also in terms of personal integrity.

The results of the central monitoring of student feedback via forms in the Academic Information System (AIS) of STU are accessible to the faculty management, the head of the department, the person responsible for the study programme and the guarantor of individual courses. Selected results of course evaluation evaluated by the faculty management can be found in the documents Annual Report on the Activities of the Faculty of Chemical and Food Technology STU in Bratislava for the given period <https://www.fchpt.stuba.sk/sk/fakulta/vyrocne-spravy.html?page_id=1760>

The person responsible for the study programme and the guarantors of individual courses respond to the results of the evaluation (whether ongoing or carried out at the end of the semester) through interviews with the employees of the department that provides the study programme. In addition, each teacher is obliged to inform students at the beginning of the semester about the results of the evaluation in the last academic year and to acquaint them with the measures that have been taken to remedy possible shortcomings. The aim is to achieve a continuous improvement in the quality of education provided so that it reflects the latest global trends and the legitimate demand of students for the availability of quality education. In the future, the evaluation of individual courses will also be the topic of the meeting of the study programme board.

1. Results of graduate feedback and related measures to improve the study programme quality.

Since the start of the ongoing monitoring of student feedback through surveys after each scheduled activity in the winter semester 2019/2020, a total of 1,818 questionnaires were filled by the students, with the average grade for "comprehensibility and adequacy" being 4.64 points out of 5 possible. The average rating for the question "approach and reading of the teacher" was 4.78 points out of 5 possible. It is therefore possible to state that the students were very satisfied with the level of courses provided by the department that provides the study programme Process Control. Such a high rating is the result of the teachers' immediate response to the feedback provided weekly, which significantly reduces their reaction time and improves the quality of teaching. An example of measures to improve the quality of the study programme is the timely availability of audiovisual recordings of all lectures and exercises to students so that they have the opportunity to recall the lectured material before the exercises.

1. **References to other relevant internal regulations and information concerning the study or the study programme student** (e.gstudy guide, accommodation regulations, fee directive, guidelines for student loans, etc.).

The full text of the Rector's Directive No. 4/2020-SR of 08 September 2020 Tuition and fees associated with studies at the Slovak University of Technology in Bratislava for the academic year 2021/2022, amended by Amendment No. 1 [**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/legislativa/predpisy\_2021/EN\_Smernica\_skolne\_a\_poplatky\_2021\_2022\_D1.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2021/EN_Smernica_skolne_a_poplatky_2021_2022_D1.pdf)

Tuition and tuition fees

[**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/legislativa/predpisy\_2021/prehlad\_vysky\_poplatkov\_PK\_na\_akad\_rok\_2021\_2022\_web\_EN\_FINAL.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2021/prehlad_vysky_poplatkov_PK_na_akad_rok_2021_2022_web_EN_FINAL.pdf)

Full text of the Rector's Directive number: 3/2017 - SR dated 30 June 2017 Rules for allocating accommodation to students in accommodation facilities of the Slovak University of Technology in Bratislava as amended by Amendments No. 1 to 3

[**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/legislativa/predpisy\_2020/EN\_Stip.\_poriadok\_uplne\_znenie\_\_DD1\_DD2\_DD3.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/EN_Stip._poriadok_uplne_znenie__DD1_DD2_DD3.pdf)

Amendment No. 1 to the Rector's Directive No. 3/2017 - SR of 30 June 2017 Rules for allocating accommodation to students in accommodation facilities of the Slovak University of Technology in Bratislava as amended by Amendment No. 1 dated 06 September 2018, Amendment No. 2 dated 21 January 2020, and Amendment No. 3 dated 19 January 2021. Criteria for allocating accommodation to students of the Slovak University of Technology in Bratislava[**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/legislativa/predpisy\_2021/EN\_Uplne\_znenie\_Pravidla\_ubytovania\_s\_dodatkom\_1\_2\_a\_3od\_19\_01\_2021.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2021/EN_Uplne_znenie_Pravidla_ubytovania_s_dodatkom_1_2_a_3od_19_01_2021.pdf)

STU student dormitories in Bratislava

[**https://www.stuba.sk/english/ects/ects-information-package/general-information-for-students/accommodation.html?page\_id=5461**](https://www.stuba.sk/english/ects/ects-information-package/general-information-for-students/accommodation.html?page_id=5461)

STU Scholarship Regulations

[**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/student/legislativa/legislativa\_english/Stipendijny\_poriadok\_STU\_schvaleny\_AS\_STU\_28\_10\_2013\_EN.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/student/legislativa/legislativa_english/Stipendijny_poriadok_STU_schvaleny_AS_STU_28_10_2013_EN.pdf)

The full text of Internal Regulation No. 8/2013 of 29 October 2013 Scholarship Regulations Slovak Technical University in Bratislava, as amended by Amendments No. 1 to 3

[**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/legislativa/predpisy\_2020/EN\_Stip.\_poriadok\_uplne\_znenie\_\_DD1\_DD2\_DD3.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/EN_Stip._poriadok_uplne_znenie__DD1_DD2_DD3.pdf)

Loans for students and teachers from the Education Support Fund [**https://www.stuba.sk/english/ects/ects-information-package/general-information-for-students/financial-support-for-students.html?page\_id=5456**](https://www.stuba.sk/english/ects/ects-information-package/general-information-for-students/financial-support-for-students.html?page_id=5456)

STU Support Rules for Top Athletes: [**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/legislativa/nove\_predpisy\_2013/Smernica\_podpora\_vrcholovych\_sportovcov.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/nove_predpisy_2013/Smernica_podpora_vrcholovych_sportovcov.pdf)

Rules for awarding the award Rector's Award of the Slovak University of Technology in Bratislava: [**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/student/legislativa/smernice/2015\_2016/Smernica\_Cena\_rektora\_UZ\_v\_zneni\_DD\_1\_EN\_FIN.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/student/legislativa/smernice/2015_2016/Smernica_Cena_rektora_UZ_v_zneni_DD_1_EN_FIN.pdf)

Rules for awarding the Student of the Year award at the Slovak University of Technology in Bratislava: [**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/legislativa/predpisy\_2020/EN\_Smernica\_Student\_roka\_Dodatok\_08.09.2020.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/legislativa/predpisy_2020/EN_Smernica_Student_roka_Dodatok_08.09.2020.pdf)

Framework rules for student scientific and professional activities: [**https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd\_vzdelavania/student/legislativa/vnutrouniverzitne\_predpisy/ramcove\_pravidla\_svoc.pdf**](https://www.stuba.sk/buxus/docs/stu/pracoviska/rektorat/odd_vzdelavania/student/legislativa/vnutrouniverzitne_predpisy/ramcove_pravidla_svoc.pdf)

1. *The institution compiles a description of the study programme as an annex to the application for accreditation of the study programme.*

   * *When submitting an application pursuant to § 30 (1) of Act no. 269/2018 Coll. the higher education institution states in the description only the data available at the time of application.*
   * *Once the accreditation (or the internal approval of the study programme by the institution programme approval authority with the right to design programmes within the given field and degree) has been granted, the institution permanently makes the description available to the stakeholders of the study programme.*
   * *The institution may choose the form of processing, visualization, and publication of the description, suitable for students, teachers and another users.*
   * *In individual parts of the description, the institution may refer to another internal document that sufficiently describes the relevant area and is publicly available.*
   * *In individual parts of the description, the institution may refer to a place in the information system which contains the relevant up-to-date information.*
   * *The institution ensures that the description is up-to-date (if the change in the description is in the nature of a modification of the study programme and the change is made in accordance with § 30 (9) of Act No. 269/2018 Coll., the institution makes the change and publishes it only after approval by the Agency).*

   [↑](#footnote-ref-1)
2. *If the change is not a modification of the study programme according to § 30 of Act no. 269/2018 Coll.*  [↑](#footnote-ref-2)
3. *It is stated only if the accreditation of the study programme has been granted according to § 30 of Act no. 269/2018 Coll.* [↑](#footnote-ref-3)
4. *According to the International Standard Classification of Education. Fields of Education and Practice 2013.* [↑](#footnote-ref-4)
5. *According to § 60 of Act no. 131/2002 Coll. on Higher Education Institutions.* [↑](#footnote-ref-5)
6. *It means the languages in which all learning outcomes are achieved and all related courses of the study programme as well as the state examinations are carried out. The institution independently provides information on the possibility of partial study parts/courses in other languages in part 4 of the description.* [↑](#footnote-ref-6)
7. *Learning objectives are achieved in the study programme through measurable learning outcomes in individual parts (modules, subjects) of the study programme corresponding to the relevant level of the Qualifications Framework in the European Higher Education Area.*  [↑](#footnote-ref-7)
8. *In the case of regulated professions in accordance with the requirements for the acquisition of professional competence pursuant to a special regulation.* [↑](#footnote-ref-8)
9. *Selected characteristics of the content of the study programme can be stated directly in the Course information sheets or supplemented by the information of the Course information sheets.* [↑](#footnote-ref-9)
10. *In accordance with Decree no. 614/2002 Coll. on the study credit system and Act no. 131/2002 Coll. on Higher Education Institutions and on Amendments to Certain Acts.* [↑](#footnote-ref-10)
11. *During the assessment, teachers responsible for the course will allow the working group access to the study materials of the course and the content of individual educational activities.*  [↑](#footnote-ref-11)
12. *We recommend indicating the workload of contact and non-contact teaching in accordance with the ECTS Users' Guide 2015.* [↑](#footnote-ref-12)
13. *E.g. when providing the professional practice or other educational activities carried out outside the university.* [↑](#footnote-ref-13)