ANNUAL REPORT ON ACTIVITIES 2019

CTU

CZECH TECHNICAL UNIVERSITY IN PRAGUE

Annual Report on Activities of CTU in Prague in 2019

Prague, May 2020

Annual Report on Activities of CTU in Prague in 2019
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1st edition

ISBN 978-80-01-06801-4

www.cvut.cz

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Introduction by the Rector

Dear readers,

For us, 2019 was a year of freedom and democracy, when we recalled the 80th anniversary of the persecution of Czech students, which led to the self-immolation of Jan Palach 50 years ago, and the 30th anniversary of the Velvet Revolution. In the international context, it was 20 years since the Czech Republic joined NATO and 15 since its accession to the European Union.

Palach's self-sacrifice is a historic milestone that ought to serve as a permanent reminder of what is at stake when freedom is lost. It deeply impacted the entire country, tested by occupation and the normalization process, spurring it out of its apathy. At a time when a sense of cruel injustice and futility prevailed, Jan Palach was the first of a number of people who resolved to make the ultimate sacrifice, paying with their lives. The others were Josef Hlavatý, Jan Zajíc, Evžen Plocek and Michal Lefčík. In sharing recollections of those courageous enough in harsh times to employ radical action to galvanize civil society, we must also recall the period and that which led up to it.

November 17 went down in history in 1939 and 1989. In both cases, events were chiefly driven by university students who succeeded in overcoming period pressures and their own justifiable fears. They behaved heroically in taking on the freshly established order and doing their utmost to maintain the democratic state in their day. The memory of those events must never fade. It is extremely important that we take as an example the students of those times, who stood up for their opinions and assessed the situation critically. We mustn't be afraid to speak up against things which could undermine stable democracy. We cannot succumb to them, resigned. This day of memory is for us a legacy that states freedom is not a given and human rights are among our highest values.

Looking back, it is chilling how long we had to suffer – during the occupation and the subsequent communist dictatorship, which plunged our country into the democratic shadows for another 50 years. We have to be vigilant and ensure times filled with despair and desperation caused by subjection and repression never return. Let's do our utmost today so that people are never alone against the powers that be.

In 2019, CTU marked the anniversaries of 17 November with a series of events. A special concert on the 30th anniversary of the Velvet Revolution was held at the Prague's Bethlehem Chapel on 26 October, in cooperation with the University of Chemistry and Technology in Prague and the University of Pardubice. The university's combined symphony orchestras and choirs, in cooperation with friendly choirs from Geneva, performed Brahms' Requiem.

The events of 1939 were recalled by a CTU Archive exhibition entitled Dark Autumn. It introduced nine representatives of student organizations who were executed and many other students who were sent to concentration camps, as well as highlighting the stories of brave CTU students and teachers who didn't hesitate to risk their lives in the struggle for liberty. A second CTU Archive exhibition, Velvet Autumn, mapped happenings at CTU at the turn of 1989/1990 in the context of national events.

Two linked exhibitions were held at the Faculty of Civil Engineering CTU on the 30th anniversary of the Velvet Revolution. They featured work created then by a number of leading photographers, such as Karel Cudlín, Jaroslav Kučera, Dana Kyndrová, Jan Šilpoch, Pavel Štecha and Jiří Všetečka, as well as period posters recalling the days of the 1989 revolution and the Civic Forum.

In early November I had the honour of visiting the Czech Centre New York, where, as part of the project Science Café, I delivered a speech about several aspects of my work, in particular the application of artificial intelligence to make civic society safer. However, I also referred to other subjects, primarily social ones, and the perhaps not so apparent (but important) role of universities in these areas. On 25 November we held at the Dejvice Campus Time of Change, an open air concert with notable musicians at which we highlighted the university's position as a place where we cultivate freedom, cooperation, truth, decency and tolerance.

As a student celebration of the anniversary of 17 November 1939, a 17 November Run was held at the Hvězda Game Reserve on 16 November, organized by the Institute of Physical Education and Sport CTU. We concluded commemorations of this historical event, in cooperation with the Foundation of Josef, Marie and Zdeňka Hlávka, with a concert held at traditional venue, the Bethlehem Chapel on the occasion of the 17 November state holiday and International Students' Day.

It is important to realize that without the courage and zeal of students we would not be where we are right now and that we shouldn't only recall their courageous actions on International Students' Day. Perhaps more than ever before, we feel today that without open-minded students of all disciplines, our society will not flourish; it will not be healthy and prosperous but will stagnate or even wither. This doesn't relate only to students' position as an engine of change in society; in the modern, technocratic era, we need also to identify and develop in them scientific and engineering thinking. I am delighted to head an institution with so many talented and active people for whom CTU offers nourishing soil and support, where they can draw on their creativity to solve questions of global importance in science and technology. I would therefore like to share some of their successes with you in the following lines.

Notable names

I would first like to name a number of students. From the Faculty of Electrical Engineering Jan Bayer, who earned best IT diploma work for a proposal for an algorithm for an autonomous robot rescuer in the international competition IT SPY. Šimon Mandlík won a prestigious UPE Award. From the Faculty of Nuclear Sciences and Physical Engineering, Roberta Bimbová earned a prize for space debris detection, while Katarína Křížková Gajdošová's doctoral work was recognized by CERN. The winner of last year's Woman of the Year award in the Plzeň Region was Alžběta Vachelová from the Faculty of Civil Engineering; she founded the project Sign Up to Change Lives, which increased the number of potential bone marrow donors. A textile body garment easing painful menstruation developed by Kateřina Rydlová from the Faculty of Architecture and experts from the Faculty of Electrical Engineering garnered media attention all year.

Of the academic staff, I would like to congratulate Professor Igor Jex, dean of the Faculty of Nuclear Sciences and Physical Engineering, who became a member of the strategic advisory board of the European research project QuantERA. At the same faculty, docent Jan Vybíral, a mathematician, won the Joseph F. Traub Award. A special mention from the AI Awards 2018, which aims to draw attention to successful experts and companies that help set the direction of AI development at world level, went to Professor Jiří Matas of the Faculty of Electrical Engineering. The Czech Management Association named Professor Vladimír Mařík, scientific director of CIIRC, Manager of the Year 2018. Šárka Malošíková of the Faculty of Architecture and Jiří Zemánek of the Faculty of Electrical Engineering were successful Fulbright Scholarship recipients. Here I would also like to mention a major loss CTU suffered with the departure of Professor Miroslav Vlček, for many years CTU vice-rector for international relations and head of the Department of Applied Mathematics at the Faculty of Transportation Sciences.

Projects, science and research

When it comes to the successes of our groups and teams, I'd like to mention Dronetag, an acclaimed start-up from the Faculty of Information Technology students, four medals for CTU Lions, the student motorbike team at the Faculty of Transportation Sciences, at the Moto GP circuit in Barcelona, third place overall for the Faculty of Electrical Engineering's CTU-CRAS team in the DARPA Subterranean Challenge Tunnel Circuit (first place among unsponsored teams), bronze for the team of Professor Zdeněk Hanzálek of CIIRC in autonomous formulas in New York, sixth place in combustion formula for CTU CarTech of the Faculty of Mechanical Engineering in Spain and third place in races in Italy and second place in electric motorbike races in Albacete.

In May, CTU helped support the creation of the initiative prg.ai, which is aimed at attracting world class scientists to the Czech Republic, expanding the base of Czech AI talent and fostering the creation of new tech firms.

July saw the foundation of the Association of Research Universities in the Czech Republic, comprising Charles University, Masaryk University, Olomouc's Palacký University, CTU and the University of Chemistry and Technology in Prague. It will work to promote high standards and to boost their standing in international competition.

The project RICAIP, with initial support of almost EUR 50 million, was also launched in 2019. Its researchers are developing the use of virtual and augmented reality for the remote management of industrial production and a system for adapting it quickly depending on the current needs of customers or available means of production.

Sport and culture

Our athletes also brought honour on our university at home and abroad. CTU's footballers triumphed at the World InterUniversities Championships in Pula, where our teams also took bronze in basketball, volleyball and badminton. Jakub Skořepa of the Faculty of Mechanical Engineering earned bronze in taekwondo at the Universiade in Zagreb. In 2019, CTU students again dominated the University Eights in 2019; the men's crew comprised Jan Hájek, Albert Caban, Jakub Paroulek, Martin Basl, Jiří Kopáč, Vít Šantrůček, Vojtěch Dědek, Jan Zavadil and Tereza Andrlová. A CTU team won the gold medal in the Ultimate Frisbee tournament at the European Aerostudent Games 2019 in Toulouse. The Engineers Prague ice hockey team lifted the silver cup at the World Championships in China. David Tolar and downhill skier Tomáš Klinský, both from Faculty of Transportation Sciences CTU, brought home medals from the 29th Universiade in Krasnoyarsk. We had a team in the event TERIBEAR Moves Prague for the first time; members of the Running Lion team ran a total of 1,966.5 km in support of the Tereza Maxová Foundation for

children. I would like to congratulate Vít Přindiš from the Faculty of Biomedical Engineering, who became European champion in water slalom at Pau in France.

The Academic Orchestra of CTU helmed by conductor Jan Šrámek performed a concert entitled Jewels of Czech and World Music at Trinity College Chapel in the UK's Cambridge.

These examples of achievements by CTU's students, faculty members and specialized teams say a lot about our university's experiences in 2019. However, there was much more to the activities and successes of our students, teachers, researchers and creative staff. As I have indicated, the well of questions and subjects seems bottomless. Incidentally, the same goes for ideas and answers. And that is a very good thing.

Lifelong learning, new study programmes and increase in applications

2019 brought several significant changes and results in the area of study. The first of these was the launch of a bilingual diploma across all types of studies: bachelor, master and doctoral. We also succeeded in changing the admission procedure; in the final phase there was a proposal for the modification and programming of the admission of applicants, with fully electronic submission of study applications.

Three-hundred and 70 courses were carried out within lifelong learning and a new website, czv.cvut.cz, was launched; it delivers not only a clearly laid out range of courses but also easy registration, including the possibility to make electronic payments directly on the site.

The last major change in the field of study was the completion and publication of new Publishing Rules; this led to a significant shortening in the process of approving the publication of course books, allowing us to respond flexibly to students' needs.

In 2019, CTU ran a total of 188 study programmes or fields of study, of which 50 were bachelor, 68 master and 70 doctoral, including both on-site and distance learning. A total of 17,229 students studied with us, of whom fewer than 5,500 were women. There were a total of 3,106 students from abroad, both self-funding and as part of exchange stays. 10,870 applications were submitted in the admission procedure and there were 9,834 applicants, which was 1,000 more than the previous year.

In cooperation with individual CTU faculties and institutes, we organized a number of events aimed at popularizing science and research and promoting technical education. These included university-wide presentations, such as the Science Festival and Museum Night, while events run by individual parts, such as Be a Woman Scientist for One Day or Be a Medical Physicist for One Day, also played a key role in popularization.

A major contribution to the promotion of CTU was made by internships for high school students, summer IT schools and holiday camps, programming courses, as well as various competitions, open days, excursions, preparatory courses and professional and educational seminars. These took place both on our campus and in high schools themselves. Some of these activities focused mainly on applicants. The most significant achievement in this regard is our annual participation in the Gaudeamus European post-secondary and lifelong learning trade fair in the Czech Republic and abroad.

Employers see CTU as a mark of quality

It is a well-known fact that CTU students are attractive as potential employees for many companies. This is borne out by interest in cooperation or the possibility of promotion among students. Major companies, such as Unicorn Systems, Škoda Auto and NET4GAS, concluded partnership agreements with CTU in 2019. Interest was not only on the part of industrial partners, as seen in cooperation with the bank Komerční banka and the CzechInvest agency. The attention of companies was also reflected in the sixth year of the School Recommended by Employers league table, where CTU faculties took second place in the overall ranking of universities. Some 532 companies from throughout the Czech Republic took part in voting.

The Association of Alumni and Friends of CTU launched a new website for members aimed at keeping them better informed not only about the activities of the association intended, but also about events organized by their alma mater. In 2019, its members visited several unique CTU premises that successfully carry out research in various fields and are open to cooperation with the application sphere.

In 2019, we opened for CTU students the 13th year of the Mentoring programme, allowing them to establish cooperation with graduates and other experts and managers, and not only in industrial companies. Students were able to compare their theoretical knowledge directly in practice, gain new experience in the fields they are studying and perhaps "plant a seed" when it comes to their future career.

Growing support for internationalization

As early as the 1990s, CTU made use of a broad spectrum of international cooperation and signed mutually beneficial agreements with a number of renowned world universities. The participation of students and faculty members in international mobility is, in our view, a highly important element of study and we support it at all levels. In 2019, Erasmus+ was once again the most significant international cooperation programme and instrument for supporting mobility. We concluded new agreements with more prestigious universities around the world, while the number of students doing courses in English at CTU also increased. Involvement in a number of projects following on from completed projects in the Erasmus Mundus programme, focused on supporting the mobility of so-called third countries to EU member states, helped CTU attract international self-funding students.

Thanks to the specialization of individual faculties and institutes, CTU established a number of examples of international cooperation at the projects level. Our membership of various international associations also attests to the prestige of the top academics and teams involved.

The project Study in Prague, which the university has been part of since 2015, has also greatly boosted CTU's internationalization. Prague constantly ranks among the top spots in league tables of popularity of international university cities. We are doing our utmost to continue working with this information and to set priorities for what is referred to as internationalization at home.

Research is chiefly about uncovering major new findings

In 2019, the CTU's research activities developed significantly in all directions, meaning in basic, applied, collaborative and contractual research, as well as in the field of innovation.

In the field of basic research, I would cite as an example the successful activities of scientific centres of applied natural sciences, informatics funded in the OP RDE programme, and scientific teams working in the field of informatics and artificial intelligence. Teams addressing the issues of advanced industrial production, robotics and Industry 4.0 successfully worked at the interface of basic and applied research.

We are proud that the Faculty of Mechanical Engineering has built four comprehensive aviation testing laboratories: dynamometric, core, propeller and flying laboratory. The system of unique testing spaces enabled GE Aviation, for instance, to develop a new GE Catalyst engine in the Czech Republic.

We understand innovation as development leading to the improvement of products or technologies. It is, therefore, at the end of the research and development chain, nearest to its application in production. In 2019, CTU created a number of promising innovations in a wide range of fields. For example, in June experts from the University Centre for Energy Efficient Buildings CTU sent the S.A.W.E.R. system to the United Arab Emirates, which began the trial production of water from the air using solar energy in real desert conditions. The technology will be presented at the Czech pavilion at EXPO 2020.

The Faculty of Information Technology possesses an extremely impressive laboratory boasting state-of-the-art teaching and research technologies in the form of humanoid robots. In addition to three Pepper robots, the Laboratory of Intelligent Embedded Systems also includes six NAO robots from the company SoftBank Robotics. Data is also an important phenomenon in today's society, thanks in part to smartphones and the Internet of Things. This means an unimaginably large amount of data needs to be managed, looked after and made accessible in some way. For that reason, the faculty has developed the groundbreaking web portal Data Stewardship Wizard, which makes this work easier for researchers and administrators; this represents an extraordinary collaboration between Czech and Dutch centres.

The Faculty of Biomedical Engineering, in conjunction with the Norwegian National Institute of Telemedicine and the University of Tromso, has developed a unique diabetes treatment support system that combines remote monitoring of physical activity, heart rate and continuous blood sugar measurement through the keeping of a diabetic diary and interprets and shares data between the patient, their family and medical facilities. The system is currently being prepared for commercial launch.

One of the platforms of our Czech Institute of Informatics, Robotics and Cybernetics is the City Centre of the Future. It is conceived as an experimental and virtual testbed of a city, region, landscape and the technical infrastructure located in it, creating a complex and interconnected system.

More such examples could be found at CTU.

Individual faculties and constituent parts of CTU again participated in grant and research, development and innovation projects supported by targeted financial support within the programmes of the largest domestic providers: the Grant Agency of the Czech Republic and Technology Agency of the Czech Republic, as well as the targeted support programmes of individual ministries of the Czech Republic and regional governments. The total amount of targeted support that CTU received for research, development and innovation in 2019 amounted to CZK 1,735,762,048.45.

The adoption of the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers have contributed to the improvement of working conditions for academic staff and researchers at CTU and to the transparency of their career paths. In 2019, the European Commission recognized this process with the bestowal of its HR Excellence in Research Award.

Dear readers,

In 2019, CTU again strengthened its position as an internationally recognized research university, developing the talents and skills of students, academic and other staff. Teaching was conducted innovatively, with the involvement of research and strategic partners. CTU remains the foundation stone of technological progress, a fact that is widely known in society thanks to its students and researchers, who create the good name of CTU. Our aim is very much to remain a strong and unified institution where mutual cooperation among all components develops. At the same time, we want to be the flagship of research in technical and exact sciences, as well as in innovation.

Doc. RNDr. Vojtěch Petráček, CSc.
Rector, CTU in Prague

Doc. RNDr. Vojtěch Petráček, CSc. / Prof. Eva Jiřičná / Prof. Nejat Olgac

Prof. Eva Jiřičná and Prof. Nejat Olgac were awarded the Doctor Honoris Causa degree at a formal sitting of the CTU Scientific Council held on 29 January 2019 at the Bethlehem Chapel in Prague.

CTU awarded the degree to the architect and pedagogue, Prof. Eva Jiřičná, as an expression of recognition and accolade for her life-long work in architecture and many years of work as educator in the field of architecture. Eva Jiřičná, who studied architecture at CTU and has received numerous international awards, lives in London, works around the world and often returns to the Czech Republic. "The education I received in my home country served me very well in the UK," says Eva Jiřičná.

Professor Nejat Olgac received the honorary degree in recognition for his substantial contribution to the development of automated control of mechanical systems, production machines and robots, primarily with transportation delays, in cooperation with CTU, for his support of the development of high-quality engineering and academic research at CTU, and for strengthening mutual relations between universities in the USA and CTU.

2019 Success Stories

S.A.W.E.R can make water from hot desert air

At the end of 2019, after 6-month real-life testing in the desert close to the city of Sweihan, the United Arab Emirates, the first prototype of the unique S.A.W.E.R. (Solar Air Water Earth Resource) system developed by scientists at CTU returned to the Czech Republic. The experimental technology had shown that water could be extracted from air in hot desert fully autonomously without the need for using external energy.

S.A.W.E.R., the most prominent project of the CTU University Centre for Energy Efficient Buildings (UCEEB), developed in cooperation with other researchers at CTU, for instance, researchers at the Faculty of Mechanical Engineering, can turn a dry and hot desert into a green landscape using water from air and energy from the Sun. The technology will become the centre of the Czech national pavilion at EXPO in Dubai. There, the system will water an oasis filled with plants that would otherwise die in the hostile desert environment.

The idea for the construction of S.A.W.E.R. came from Jiří F. Potužník, commissioner general for the participation of the Czech Republic in EXPO. After initial debates, the first concept of what the equipment should look like and how it should work was quickly converted into a realistic vision. Subsequently, we were able to present our plan at the International Engineering Trade Fair in Brno already in the autumn of 2017.

Based on requirements defined during consultations, the first prototype of the S.A.W.E.R. unit was made in 2018 under the leadership of Tomáš Matuška and was tested in the UCEEB laboratories in Buštěhrad in an ad hoc climatic chamber that simulates desert conditions. At the same time, an autonomous container system was designed to be deployed in real-life desert conditions and the project was presented to representatives of partners in the project and to the media at specialized events, fairs and seminars. The experience earned during the 6 months of testing in the desert was used in the design of the S.A.W.E.R. unit for the Czech pavilion at EXPO Dubai. Compared to the tested equipment, this version will be more powerful. The water produced by S.A.W.E.R. will be enriched with nutrients from a special photobioreactor and will be used to water the garden surrounding the pavilion, which was designed by Ing. arch. Jan Tůma, Ph.D., and Ing. arch. MgA. Jindřich Ráfl, students of the Faculty of Architecture,.

For more, visit https://www.uceeb.cz/projekty/system-sawer


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CTUU 2016 255G

A smart drone that communicates with pilots

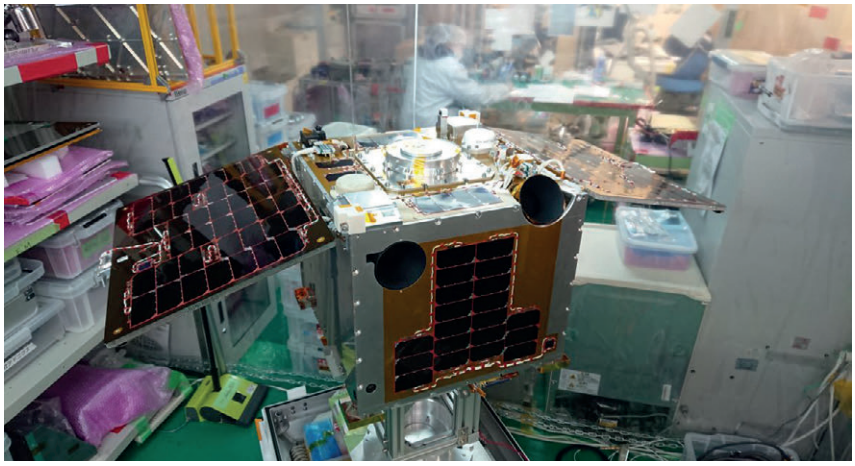
In 2019, start-up company Dronetag won the main prize in the most prestigious European competition focused on satellite navigation, Galileo Masters. Its ingenious project stunned both the jury and air traffic experts in Europe. They collected the award during the European Space Week in Helsinki, Finland, in December.

Thanks to four students (now graduates) of the Faculty of Information Technology, a smart drone that communicates with pilots – originally an idea of the future – is a real thing now. Drones are a breakthrough invention used by filmmakers, the army and amateur drone pilots. However, once airborne, they pose a threat for other participants in air traffic as drones cannot communicate with them. Drones, which have been invisible until now, will become an integral part of airspace.

Ing. Lukáš Brchl, Bc. Karel Čech, Bc. Marián Hlaváč and Ing. Adam Potroužek – these are the four names that together form the start-up Dronetag. Together, they turned their idea into small independent IoT equipment for drones that makes them smarter and able to communicate with pilots in the air. The idea was born in November 2018 at the Space Application Hackathlon, where their team came first in the Navigation category. After that they presented the project at the GSA Open Days 2018. Dronetag succeeded in solving a major problem linked to the use of drones – their invisibility. Currently manufactured drones are not able to share with other participants in air traffic their current location in real time. Not only are drones unable to see one another, they are also invisible to aircraft or air ambulances. Dronetag produces equipment that can be placed on any drone and that will make their location visible to other users and authorities. In this way, for example air traffic control can get the data and know where drones are currently located. Consequently, they will be able to warn, say, an air ambulance that there is a flying object in their trajectory that they should avoid. A key component of the system is a web platform and a mobile app in which users can monitor the surrounding drone traffic and manage other equipment connected to Dronetag.

At the Faculty of Information Technology, drones are currently used in projects in the SAGElab laboratory and in designing high-quality 3D models.

Currently manufactured drones are not able to share with other participants in air traffic their current location in real time. Not only are drones unable to see one another, they are also invisible to aircraft or helicopters. Dronetag produces equipment that can be placed on any drone and that will make their location visible to other users and authorities. Consequently, an air ambulance, for example, can be warned that it should avoid a flying object.



RISEPix module measures radiation in space

On board Japanese satellite RISESAT, which observes the Earth and monitors space environment, a RISEPix module works that was developed at the Institute of Experimental and Applied Physics. This space cooperation is one of the greatest achievements of IEAP in 2019.

The RISESAT satellite measures 50x50x50cm and weighs ca 50 kilograms. It was developed in the Space Robotics Lab at Tohoku University, Japan, as an international cooperation project. Within the project, several teams from around the world developed the equipment used on board the satellite. The IEAP CTU team developed the RISEPix module for RISESAT, which monitors the radiation environment using Timepix, a pixel detector. The new module has two of these detectors placed one above the other, which allows it to precisely detect charged particles in the Earth's magnetic field, determine their number, type, energy and direction. In this way, it can monitor the composition, intensity and changes in cosmic radiation from the Sun and space, including solar eruptions, and changes in the Earth's magnetic field. Following a series of tests of mechanical and electronic resistance, the RISEPix module was integrated into RISESAT, and on 18 January 2019, it was launched to Earth orbit by Epsilon 4 vehicle of the Japan Aerospace Exploration Agency (JAXA) from the Kagoshima Space Centre. After that, the process of putting RISESAT in operation followed, during which it was revealed that the memory module that included the details for setting up the detectors for different types of measurements had been damaged. Therefore, scientists form IEAP travelled to Japan, where they were able to establish direct connection with the satellite twice a day through a radio station at Tohoku University and where they were able to identify and remove the defect after several days. In July 2019, first pictures were made by and downloaded from the RISEPix module, which proved that the two detectors were fully operational.

The RISEPix module has thus joined other equipment in space that was developed at IEAP using the Timepix detector. Since 2012, five detectors have been monitoring the radiation environment inside the International Space Station (ISS). In 2013, European Space Agency's Proba-V satellite with the SATRAM monitor was launched. And since 2017, Czech nanosatellite VZLUSAT-1 has been orbiting the Earth, for which IEAP supplied an x-ray radiation detector.

A flying part of the RISEPix monitor. The control module is on the right, detector modules are on the left – only the upper one is visible here.

O. Velek, head of CIIRC CTU, and J.-E. Paquet, Director-General, DG Research and Innovation of the European Commission, sign a contract

European centre RICAIP will connect AI and industrial robotics with a record financial support of CZK 1.2bn

The possibility to use virtual or augmented reality to manage industrial production or a system for its rapid adjustment to customers' current needs or available means of production – these are just a few examples of what researchers will be working on under the RICAIP project unveiled on 26 September 2019 at CTU. The project moves the boundaries of how we now understand automated industrial production towards flexible, distributed production.

In the next 6 years and beyond, the partners in the RICAIP project will have access to almost 50 million Euros (CZK 1.2bn) of funding. The newly established Research and Innovation Centre on Advanced Industrial Production will be the biggest centre to study AI and industrial robotics that will rely on strategic cooperation between the Czech Republic and Germany. The partners of the project include its main coordinator CIIRC CTU, CEITEC BUT, and on the German side, DFKI and ZeMA, based in Saarbrücken.

"It is a major project that supports both the National Innovation Strategy and the National AI Strategy. It is fully in line with EU's effort to boost research in the field of industrial production with results of research in the field of artificial intelligence," said Karel Havlíček, minister for industry and trade. "I believe the project will provide substantial support to small and medium enterprises and will result in more intense cooperation with our German partners and increasing our contribution to the development of EU's production potential," concluded the minister adding that the project is of high importance and has full support of the Czech government.

Jean-Eric Paquet, Director-General, DG Research and Innovation of the European Commission, stressed that obtaining this support is an appreciation of the outstanding quality of the project under evaluation, and that only one in 15 of the submitted projects, which are of a high quality in general, received funding from the EU. Mr. Paquet said this in Brussels during the signing of a document by which the EU has allocated 15 million Euros to the construction of the RICAIP Centre of Excellence.

Since the beginning, the RICAIP centre has stressed the importance of strategic international partnerships. CLAIRE-AI, the world's largest association of AI research groups and institutes and the most dynamically developing European AI research network, has played a fundamental role in this cooperation. In just one year since it was established, CLAIRE has won the support of thousands of scientists in 34 countries.

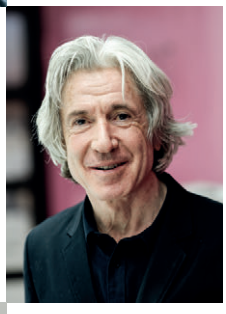
"CLAIRE and RICAIP are highly synergic, and so the fact that the two organizations have a strong presence in Prague is good for the Czech Republic, and better yet for Europe," said Prof. Holger Hoos of Leiden University, the Netherlands, founder of the initiative, during a ceremony when he symbolically opened the CLAIRE offices in Prague at CIIRC CTU. Now, RICAIP and CLAIRE are bound together not only by common challenges in the field of AI, but also by their location at CIIRC CTU in Dejvice, Prague.

November Talks

As authors of built and natural environment, architects not only define mass and spaces, functions and domains, but also interpret and transform social relations. This responsibility cannot be learnt from books, it has to be told by the very best who have succeeded in untangling and solving complicated issues and relationships of today across nations and cultures. November Talks, the successful series of lectures held at the Faculty of Architecture with financial support from the Sto-Stiftung Foundation and CTU, is a way to pass on the best professional expertise to students, teachers and the public. The topic of the year 2019 – Transformations – was selected as a prequel to the annual conference of the European Association for Architectural Education EAAE 2020, which will take place in Prague under the title New Dimensions: The Increase in Scale and the Overlapping of Disciplines. In their work, the guests that the Faculty of Architecture welcomed in November 2019 – I. and J. Benda, J.-M. Fritz, M. Desvigne and A. Madanipour – cross the boundaries of previously clearly defined professions of architects/urban planners/landscape architects, which currently is a great challenge in terms of cooperation and education of future professionals in these disciplines.

More than a decade ago, the then dean of the Faculty of Architecture, Z. Zavřel, started a tradition of series of lectures by leading international architects, urban planners and landscape architects to be held annually. The first such series, held in 2007, welcomed Dutch female architects J. Bekkering, M. Loof, D. Ponec, H. Snel and J. Dekkers, who came to Prague not only as presenters at the conference, but also as leaders of a joint Czech-Dutch workshop and reviewers of final presentations of studio projects. At around the same time, the Sto-Stiftung Foundation was established with the aim to fund education of young people and students in the field of civil engineering and architecture, and in 2015 its chair of the board, U. Koos, chose the Faculty of Architecture CTU as one of the 6 prestigious European universities – along with ENSA Paris-Belleville, the University of East London, Università IUAV di Venezia, Universität Stuttgart and Technische Universität Graz – to organize annually a series of lectures entitled November Talks by international architects with financial support from the Sto-Stiftung Foundation. Since then, 21 leading architects, urban planners and landscape architects have already visited Prague in the course of five editions of the event. In 2015, Prague welcomed architects from Israel – D. Knafo, E. Kimmel, L. Lovinger and A. Karmi – a year later famous architects from Denmark visited – S. Øllgaard, F. R. Thomsen, J. Andersen and M. Kaltoft – and in 2017 international superstars architects J. van Rijs, R. Mahlamäki, K. Christiaanse and F. Moussavi came to Prague. In the spring of 2018, vice-dean I. Fialová was put in charge of the event and focused her attention on presentation of different approaches to creation of built environment in all its scales. Architects M. Barani, M. Corea and G. Zündel and V. Perović were invited to present on the topic of Visions. V. Perović also became visiting professor for the whole academic year.

Ali Madanipour

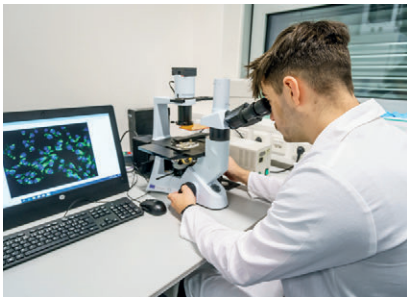


Michel Desvigne

Jean-Marc Fritz

Ivana and Jan Benda

New equipment for tissue engineering and robotic rehabilitation



Laboratory of flow systems for tissue engineering

Laboratory of robotic rehabilitation

Laboratory of simulation and practical methods for population protection

Several laboratories with unique instrumentation designed for instruction of students as well as scientific and research activities were opened in 2019 at the Faculty of Biomedical Engineering CTU in Kladno.

Thanks to financial support to project CZ.02.1.01/0.0./0.0./16_017/0002244 Modernization of Laboratories for Biomedical Engineering, new laboratories for tissue engineering and the development of bioreactors for dynamic cell cultivation and regenerative medicine were built: a laboratory of flow systems for tissue engineering and organ perfusion and a laboratory for the development of experimental equipment and modules for biomedicine. Unique equipment acquired under this project includes a 3D bioprinter for printing of hydrogel cell carriers and a 4SPIN system for electrostatic fibre spinning of polymers and preparation of nanofibre carriers. A research team at the faculty called Bioreactors for Tissue and Organ Replacement focuses primarily on cardiovascular replacements on the basis of decellularized carriers, i.e. tissues cleared of original cells and cell fragments that may provoke a possible immune response. The research aims to create cardiovascular replacements of blood vessels and valves "tailored to fit individual patients". The laboratory of robotic rehabilitation, which the faculty acquired through the Ministry of Education, Youth and Sports, has cutting-edge robotic equipment for restoration of walking, mainly for patients with neurological diagnosis and post-traumatic symptoms. Thanks to this multi-million investment, the faculty now has available equipment that is on par with the best equipped specialized rehabilitation care workplaces in the Czech Republic, and at the same time CTU is the first Czech university with such a well equipped rehabilitation laboratory. The laboratory has equipment for diagnostics and functional therapy of walking problems and restoration of hand grip function as well as a comprehensive therapy of the locomotor apparatus with feedback sensors that use data for movement visualization, which improves the efficiency of the therapy. It also has systems available that could build on research in the field of telemedicine and in this way check remotely the course of patient's treatment. So far, several research studies into telemedicine have been conducted at the faculty, but no research study focused on rehabilitation has been done yet.

Also a laboratory of simulation and practical methods for population protection opened in 2019 where new methods of instruction and drill training for the components of the Integrated Rescue System were introduced using virtual reality, namely the XVR simulation software that is used in the instruction of students of rescue disciplines at FBME. The XVR on Scene software tool and specialized XBR Resource Management software is not used by any other professional or educational institution in Central Europe. This software is then complemented with a unique 3D model of the landscape measuring 6.5x4m in which a wide range of emergency situations can be simulated and their impacts on the environment can be analyzed.

Tempering hall at CVSM Roztoky

Homologation of vehicles

Thanks to the modernization of the Centre of Vehicles for Sustainable Mobility (CVSM) in Roztoky, vehicles can be homologated in accordance with new EU regulations, starting from January 2019. The Faculty of Mechanical Engineering CTU and TÜV-SÜD Czech can homologate vehicles with combustion, hybrid engines and electric motors in the centre. The facility can be used for homologation of vehicles as well as research in the automotive domain, engines and uses of cars.

Since 1 January 2019, new EU regulations for homologation of vehicles have been in place. Most importantly, the measurement of car emissions has changed. The homologation test consists of measurement in laboratory and on the road. The laboratory test serves as a benchmark for the test on the road; therefore, the conditions under which it is run are now stricter. The main change is that the measurement must now be performed when all parts of the car have a temperature of 23 degrees Celsius. In order to achieve this temperature, a test drive is conducted on a drum brake with the measurement of produced emissions in the course of a defined drive cycle. After that, a similar cycle is reproduced on the road with portable emissions measuring systems attached to the car. Another change is that it is now mandatory that cars launched on the market must be tested in all the combinations on offer – for example, car – engine – transmission, etc. This means the procedure is quite time-consuming when it comes to the actual measurement but also when preparing the car so that it has the required temperature.

Due to the new legislation that stipulates that cars must be tested in more states than previously, many car makers reduced their offer in the autumn of 2018 as not all models had been homologated in accordance with the new rules. Cars in the Czech Republic are homologated by TÜV-SÜD Czech in cooperation with the Faculty of Mechanical Engineering CTU at the Centre of Vehicles for Sustainable Mobility in Roztoky. The existing laboratory equipment did not comply with the new EU legislation and there were concerns that homologation would no longer be conducted independently of the producers. For this reason, the faculty together with TÜV-SÜD Czech signed a memorandum on joint investment in the amount of ca CZK 20 million to be spent on a tempering unit that CVSM did not have and that was needed in order to carry out homologation in accordance with the new legislation. It was no easy feat. Company Trigema that built the unit, which FME CTU rents from the company based on a contract, put everything into it. TÜV-SÜD subrents from CTU. Taking such a risk was only possible thanks to a donation of USD 1 million by Thomas Morel, a graduate from the Faculty of Mechanical Engineering, in 2017. Although this money was not spent on the unit, it serves as a security thanks to which the faculty was able to take the risk. A tempering hall needed to be built as an extension of the existing CVSM building, where up to 12 cars can be tempered to 23 degrees Celsius and two passenger cars can be tempered to 14 degrees Celsius. Furthermore, TÜV-SÜD Czech invested in the modernization of measurement on the drum brake. Consequently, starting from January 2019, cars can be homologated according to the new EU rules.

Research into the use of hydrogen admixture in the combustion process, which further reduces the emissions produced by combustion engines below today's levels, which was considered otherwise impossible, is an example of what was achieved in 2019. Another example is the ongoing development of mobile emissions measurement, that is, the technical conditions of cars used on roads. Such equipment can be used in cities.

The actions taken jointly by the Faculty of Mechanical Engineering and TÜV-SÜD Czech ensured that cars can continue to be independently homologated in the Czech Republic. A public university took on a long-term risk to make sure that the Czech Republic still has control of this closely observed area.

Portable emissions measuring system in live operation at CVSM Roztoky

Connecting a car's exhaust system to CVS at the emissions laboratory at CVSM Roztoky

Emissions laboratory with the drum brake at CVSM Roztoky

Replica of an armoured bell

A reinforced-concrete replica of the upper part of the AJ-S-D armoured bell was made in the framework of a Ministry of Culture's project ČR NAKI II DG18P02OVV0063 Development of Progressive Remediation Procedure for Restoration and Conservation of Military Fortification Objects from the 1930s carried out at the Faculty of Civil Engineering CTU in the years 2018-2022 as part of a comprehensive remediation measure developed by employees of the faculty J. Pazderka, P. Reiterman, T. Pavlů and M. Ženíšek. A copy of the bell from 1938 of the same proportions as the original was displayed in front of the faculty's building until 11 October 2019. After that it was transported to Červený Kostelec, where it was fitted to fortress T-S 20 and the bell was fixed to the fortress structure with concrete.

Armoured bells were part of fortification objects of the so-called heavy fortification built in Czechoslovakia in the years 1935-1938. At the time of the cession of Sudetenland to Nazi Germany in October 1938, these objects contained nearly 400 armoured bells, mostly of the types AJ-S-N and AJ-S-D to be fitted with light or heavy machine guns. During the Nazi occupation, a majority of these bells were dismantled and the metal was used for war production in Nazi Germany. The bells were usually dismantled using explosives that significantly damaged the fortresses. After the end of World War II and the takeover of power by the Communist Party, most of the remaining armoured bells at the fortresses were blasted and used as a source of metal. Consequently, the original armoured bells have not survived in a vast majority of the Czechoslovak heavy fortification objects.

Today, a number of fortification objects are being restored by military history clubs, and the renovation of the bells is the main financial burden.

Therefore, the project team at the Faculty of Civil Engineering wanted to come up with a solution that would comply with the requirements for the authentic external and internal design of the armoured bell, allow for installation of period guns to show visitors of the fortress museum how they worked, would be durable and affordable for the owners of the fortification objects. In the end, a replica of the upper part of the armoured bell was made which led to a unique technical solution that was registered as utility model CZ32920(U1) by the Industrial Property Office on 4 June 2019. It is a ferroconcrete prefabricate that emulates the upper, visible part of the original armoured bell, which, however, lacks the massive lower part of the original bell embedded in the fortress's structure. When the component is installed, the damaged part of the fortress structure (in case of blasted bells) is fixed with concrete, or the shaft that replaces the lower part of the bell (in case of fortresses that had not been fitted with bells by 1938, like fortress T-S 20) is fixed with concrete.

A unique footbridge across the Dřetovický brook

A unique footbridge that was installed in the village of Vrapice near Kladno in 2019 as part of a footpath between the village and the cemetery has earned attention as well as awards for its shape and used material and technology. It was selected from among numerous other projects for the award of the prestigious title of the Finalist of the Czech Architecture Award as part of the Czech Grand Prix for Architecture in the Landscape Architecture category. A comment by one of the expert jurors stated that: "Thanks to its extremely thin form, it looks like it's floating in the air. Once you get to the footbridge, you will immediately feel the urge to touch its sides and you'll be surprised that they feel like skin to the touch." Thus, the authors were able to turn a humble footbridge into a piece of art and its simple design to an architectural gem. Experts at the Klokner Institute CTU who dedicate to material research in the field of concrete and cement composites played a crucial role in its construction.

The story begins in 2016. The architects' vision led to the design of an arched shell footbridge with a U-shaped cross-section, 10m in length, curved both vertically and horizontally. Already at the initial design stages, authors strived to create a perfect harmony between the surrounding landscape, the "Guardian" sculpture and the footbridge. The shell structure meant that the walls and the walkway could have the thickness of 30-50mm. Formerly, a typical material to be used for such designs was steel, but from the very beginning this project planned to use Ultra-High Performance Concrete (UPHC). This material has a unique composition, workability and, for cement materials, unusual tensility and in particular compressive strength. This opens a space for designing new, unique and previously unachievable construction elements.

Ever since the preparations started, there were doubts whether the element can be built. The static solution, technology of the material, casting and making of the footbridge were designed at the Klokner Institute. However, without close collaboration with colleagues from KŠ Prefa, s.r.o., the thin-walled arched footbridge would never be built. The production process itself faced many difficulties. New technological procedures and methods that were very different from the previously used ones had to be devised.

Experts at the Klokner Institute carried out non-linear static analyses of the projected shape of the footbridge which proved the static acceptance of the construction system. As regards the used material, it is quite unique that UPHC has a load-bearing function and is reinforced only by dispersed fibre reinforcement. The footbridge is made of a cement composite that was not additionally reinforced with steel beams as is usual in concrete structures. This also makes the footbridge unique.

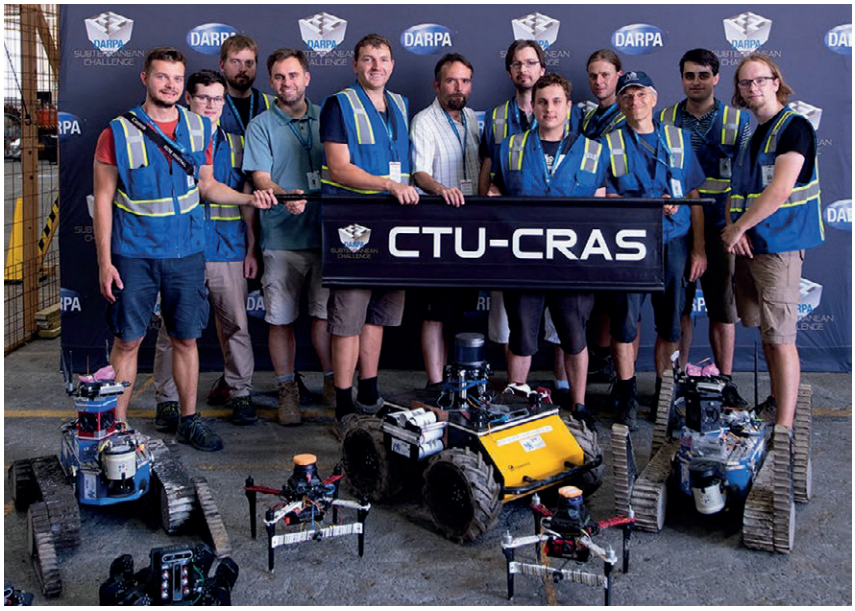
The elegant black bridge from coloured UPHC with added patina by etching was installed in 2019 by KŠ Prefa, s.r.o., and since then has been used as planned.

Authors of footbridge: Petr Tej (Klokner Institute) and Ondřej Císler (AOC)
Author of sculpture: Jan Hendrych
Technology of production: Jiří Kolísko (Klokner Institute)
Implemetation: KŠ Prefa, Klokner Institute
Photo: Boys Play Nice

Prize for detecting space debris

A presentation by Bc. Roberta Bimbová entitled Photon Counting Detector Package for Space Debris Optical Tracking was selected as Outstanding Student Presentation at the SPIE Optics+Optoelectronics 2019 international conference.
Together with the award, Roberta Bimbová, student in the second year of the master study programme at the Faculty of Nuclear Sciences and Physical Engineering, CTU, also received a SPIE Student Membership of the International Society for Optics and Photonics and the possibility to download up to 25 articles from the SPIE Digital Library. Her presentation was based on an article that she wrote together with colleagues at her department, Prof. Ivan Procházka, Josef Blažej and Jan Kodet. The article was then published in SPIE Proceedings. "The experience of presenting and writing the article was priceless. The response to my presentation was very positive and thanks to the event I also gained a lot of useful contacts in my branch," adds Roberta, who has worked at the detector ever since the selection of the topic of her bachelor thesis in 2017. She chose the modification of the detector's control circuit because she liked the practicality of the subject, which she consequently tested herself with soldering iron in her hand. The detector has been growing in popularity as space debris is becoming a serious problem.

NASA claims that over half a million pieces of space debris of different sizes is orbiting the planet. This debris comes from equipment sent to space by humans and includes broken satellites, burnt-out parts of launch vehicles, leftovers form experiments, etc. Even the smallest parts of space debris can damage or destroy other equipment in orbit since they travel at almost 28,000 km/h. Therefore, there is a tendency to monitor or destroy the debris. And this is where the device developed at FNSPE as part of optical telescopes on Earth's surface can help. While larger objects in space can be detected using radiolocators, due to low-band wavelengths smaller objects are invisible to such detectors. Optical detection is the only option here. The developed detector works in two regimes. The continuous operational mode uses passive monitoring as it detects objects illuminated by the Sun in the darkness. The gated mode uses active tracking, i.e. the well-known laser ranging. Thanks to the control unit and the source of the detector, it is easy to switch between the modes, which in turn makes the installation and operation of the detector on the telescope easier.
Thanks to her work on the optical detector, Roberta also received recognition by Forbes, which included her on its 30 under 30 list of talented, competent and successful people under 30.



Multi-robot subterranean search

The first round of the DARPA Subterranean Challenge, Tunnel Circuit (DARPA SubT) was held in Pittsburgh, USA, on 15-22 August 2019. A team composed of scientists and students at the Centre of Robotics CTU-CRAS at the Department of Cybernetics, the Faculty of Electrical Engineering CTU, participated with their multi-robot system for searching areas hit by a catastrophe. The CTU-CRAS team came first in the category of teams not funded by the Defense Advanced Research Projects Agency (DARPA) of the United States Department of Defense, as well as winning third place among all teams.

The DARPA Subterranean Challenge aims to test the possibilities of systems of autonomous collaborative robots that can search underground areas without human assistance. The competition held in Pittsburgh focused on testing the ability of current robotic technology to detect the presence of miners trapped underground following natural or industrial disaster events.

The organizer of the competition, DARPA, has an annual budget of USD 3.5bn, and over 15 years ago it initiated the development of self-driving cars by holding the first DARPA Grand Challenge. Autonomous vehicles are now entering the market, so it can be expected that a similar breakthrough will be made in the application of new generation of autonomous robotic systems that will be able to collaborate efficiently based on the efforts made by the best robotics teams in the framework of DARPA SubT. Furthermore, they will be independent on any external infrastructure, such as mobile networks and satellite navigation that are not available underground.

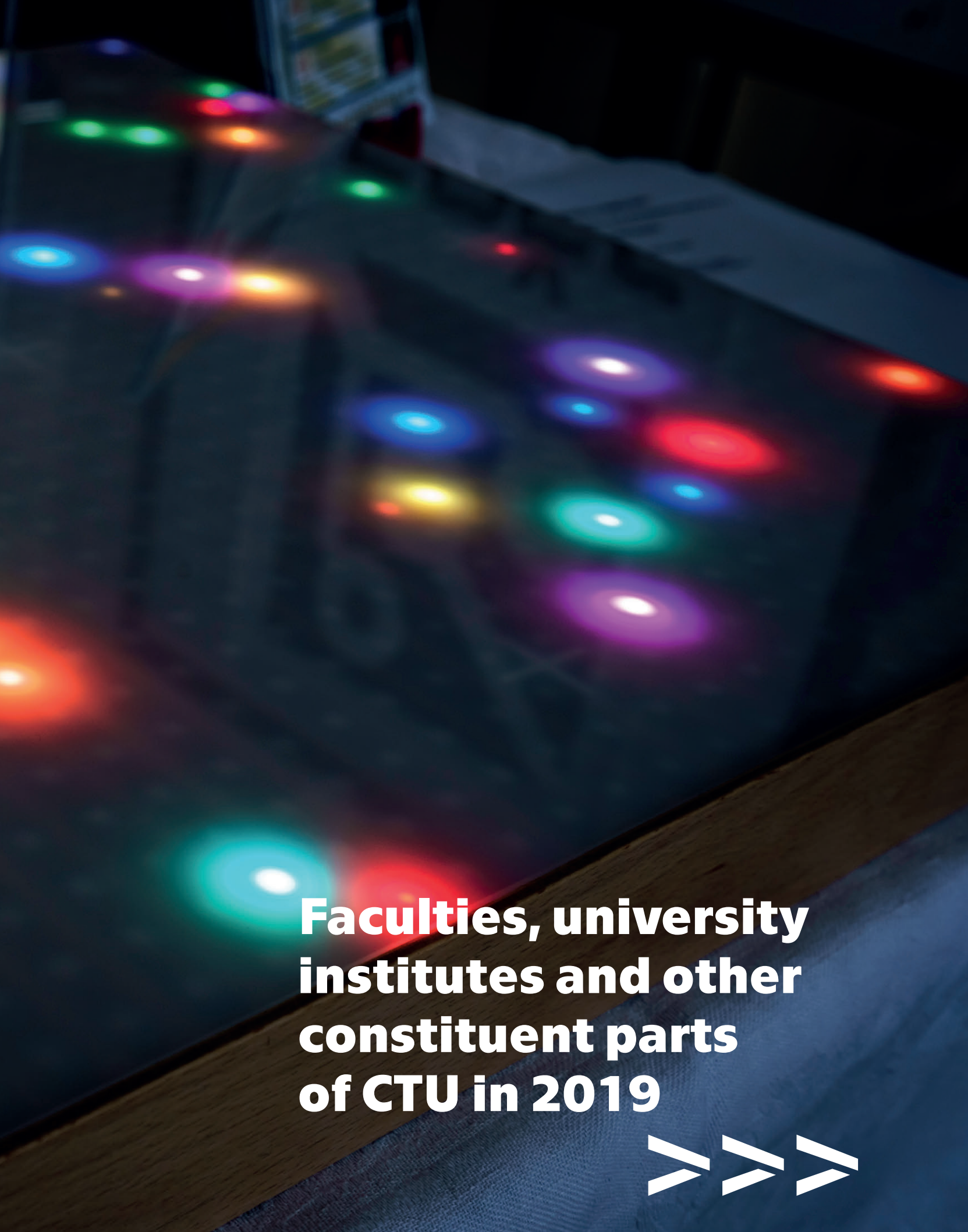
The competition's focus was attractive for scientists and students alike as it covered an area that the experts at the Faculty of Electrical Engineering have been teaching and researching while they are aiming at extending the boundaries of the current level of knowledge. The great success of the CTU-CRAS team in the Tunnel Circuit is the result of many years of systematic efforts by our research teams in the field of mobile robotics. The involvement of students was another substantial benefit as it offered them a unique opportunity to gain experience in deployment of robotic systems in difficult conditions that test the robustness and reliability of the developed systems. A system of robotic search based on a diploma thesis defended in June 2019 was deployed in the search of the tunnels.

During the real-life deployment in the tunnels of the underground mine in Pittsburgh, the CTU-CRAS team was as good as the teams from the best international workplaces, including the Carnegie Mellon University, the Commonwealth Scientific and Industrial Research Organisation, Eidgenössische Technische Hochschule Zurich, Massachusetts Institute of Technology, NASA's Jet Propulsion Laboratory, and scored far better than most other teams and in the end it was the only team that received the prize worth USD 200,000 among non-funded teams.

The most important part of the robotic team were subterranean robots. The researchers at the faculty have long-term experience with their deployment and research, both from EU projects and real-life exploratory missions.

Smart Cities

The award of accreditation to the master double-degree study programme "Smart Cities" was one of the greatest achievements of the Faculty of Transportation Sciences CTU in 2019. It is recognition of the long-term cooperation with the University of Texas at El Paso (UTEP), ranked as a R1 research university in the USA. Graduates from the new study programme will be awarded a Czech and a US degree, which will open for them a wide range of possibilities of work in this interesting field on an international level.
The award of accreditation was the culmination of a long story of the Smart Cities at the Faculty of Transportation Sciences, which is inextricably linked with Professor Miroslav Svítek, who started to develop this topic as the faculty's dean (2010-2018) and who received the prestigious Smart Cities Personality award in 2019. Since the Faculty of Transportation Sciences has been rooted in systems science since its establishment in 1993, the field of Smart Cities naturally fits in its scientific and pedagogical portfolio. In addition to systems approach, since the beginning focus has been given to the human dimension of the used technology. It is exemplary that the new study programme in Smart Cities was developed in close cooperation with the Faculty of Architecture CTU, which also reinforced internal cooperation within CTU.
The annually held IEEE conference Smart City Symposium Prague (SCSP), whose 5th edition took place in 2019, is an inseparable part of the cooperation with UTEP. It is a great tradition that since 2016, every year the conference has been accompanied by a Smart Cities Student Workshop (SCSW) – a two-week summer school for Czech and American students during which mixed Czech-US teams solve practical tasks commissioned predominantly by the public sector. The first years of the conference were attended by students from the University of Maryland. In 2019, students from UTEP were in attendance for the first time as a vanguard of the new study programme in Smart Cities. Dr. Petra Skolilová is the person responsible for the smooth organization of both SCSP and SCSW.
In 2019, also the first joint research activities of the Faculty of Transportation Sciences and UTEP were performed, including, among other things, a Smart Campus or a Smart Border. Students of the newly accredited programme will naturally be able to get involved in the above projects. On a fundamental level, all these incentives stem from exchange of visiting professors, when in 2015, Prof. Carlos Ferregut, ex-dean of the College of Engineering UTEP, spent one semester at the Faculty of Transportation Sciences. Between 2014 and 2016, doc. Tomáš Horák worked at UTEP, and since 2018, Prof. Miroslav Svítek has held a regular course at UTEP named Smart Cities Fundamentals, one of the core subjects in the newly accredited programme in Smart Cities.
Of course, the story of Smart Cities goes on. At the end of 2019, an application for accreditation for a follow-up doctoral study programme was submitted, whose guarantor is Prof. Ondřej Přibyl. An expert group on smart cities was created on a national level named Czech Smart City Cluster (CSCC), which unites organizations of different focus and tries to coordinate their activities to ensure synergetic development of this area and expected targets were met jointly. It is interesting to note that the members include 12 leading Czech universities that, since they are located in major Czech cities, constitute regional Smart Cities centres.



Faculties, university institutes and other constituent parts of CTU in 2019

The instruction of civil engineering in Prague began over 300 years ago, which is a great commitment for us. Today, the Faculty of Civil Engineering has the biggest number of students among the faculties of the Czech Technical University in Prague. Our faculty offers a number of bachelor, master and doctoral study programmes within structured studies, of which some are implemented in the framework of consortia of leading European universities. We provide an excellent education by the best experts in their respective fields. At the same time, we make sure that the faculty's name is a guarantee of a quality education as we are extremely proud of the renown the faculty enjoys thanks to the hard work of generations of our predecessors.

In addition to training and education of future experts in the field of civil engineering, architecture and geodesy, the faculty also connects cutting-edge research and practice, thus contributing to the implementation of modern technological solutions. We are honoured that the faculty's partners include major construction companies that offer excursions, internships and training to our students and support their stays abroad under the Erasmus programme, or as part of bilateral agreements. They appreciate that our students and graduates are characterized by a combination of a solid theoretical background, expert knowledge and creative skills. They show a steady interest in our graduates and offer them interesting and high-quality jobs.

What makes me most happy is the fact that our faculty has become a place where creative people from different fields work together. I am certain that its future development is ensured by the experience of the older generations, enthusiasm of the younger generations and by cooperation between academic workers and students.

Prof. Ing. Jiří Máca, CSc.
Dean, Faculty of Civil Engineering, CTU

FACULTY OF CIVIL ENGINEERING

Study programmes

Civil engineering is a specific branch of education that cannot fully function without interconnection of instruction and practice. The application sector in construction dominates over theoretical basis. New elements have to be introduced into instruction as practice advances. We have therefore dramatically reviewed and revamped all existing bachelor and some master study programmes in the framework of new accreditations. Also doctoral study programmes were revamped and a lot of them are now accredited also in the English language. A bachelor study programme in Civil Engineering in Czech and English, a master study programme in Integral Safety of Buildings in Czech and a master study programme in Water and Environmental Engineering in English were newly accredited. Also other accreditations are being prepared that build on traditional instruction of civil engineering and connected construction engineering disciplines. New technologies and tools for designing and planning, primarily BIM and VR, are being introduced to instruction. A lot of emphasis is put on inclusion of outside experts who participate in lectures and instruction, preparation of commissioning of course papers and final theses, participation in specialized committees, primarily for state final examinations, and by reviewing theses. In cooperation with outside experts, the faculty prepares student competitions at local and international levels; students can take part in internships. Thanks to this close cooperation, the civil engineering field is constantly being improved as qualified and demanded experts from the Faculty of Civil Engineering enter civil engineering practice.

Projects

Scientific, research and development activities are among the faculty's key priorities, in which it achieves exceptional results. Research teams are involved in a number of GA ČR and TA ČR projects and other departmental grant systems. Also the participation in international projects under H2020, COST, IEA and other programmes is of great importance. The faculty has a long tradition of cooperation with commercial subjects in the form of contractual and applied research under projects of TA ČR and other providers. Last but not least, the faculty offers a wide range of services of authorized laboratories and certified experts. Also significant external cooperation exists with other universities, institutes of the Czech Academy of Sciences, departmental institutes, companies and foreign institutions. The main sources of financial support for scientific research activities are Czech grants and projects.

International cooperation

One of the faculty's priorities is cooperation with over a hundred foreign universities and selected prestigious workplaces from around the world, which primarily takes the form of students and academicians' study stays abroad.

The Erasmus + programme is the dominant one, but there are a number of other opportunities to go abroad and receive a financial support, of which not all are fully used. Therefore, efforts are in place to support and raise awareness of student stays, of which most are in Europe. However, there are many longer stays in farther destinations; we have high-quality representatives taking part in joint-degree and double-degree programmes whom we support financially. Other opportunities exist based on international agreements.

International programmes and stays are focused on cooperation in science and research, short-time exchange programmes for researchers, development of joint research projects, establishing contacts with workplaces abroad etc. However, we lag behind in the number of incoming teachers, which is in part due to the extent and form of instruction (we do not commonly use block teaching); our short-term goal is to support and popularize this type of international activity. Teaching in foreign languages (English) and harmonization and support for involvement of visiting professors will be an important part of modernization of international cooperation. We are delighted that the number of foreign students primarily in doctoral study programmes at CTU is growing. A lot of these students have come to CTU based on activities undertaken by individual departments and their outgoing members as well as CTU as a whole (e.g., Study at CTU, Study in Prague).

Awards

Last year, a number of students and employees at the faculty received prestigious awards. PhD student Ing. arch. Alžběta Vachelová won the "Woman of the Region" competition in the Plzeň Region with her project called "Sign Up to Change Lives!". PhD student Ing. Zdeněk Prošek was the winner of a competition organized by the Ministry of Industry and Trade under the title "Turning Waste to Resources 2019" with the project "Low-cost Construction System with High Content of Waste Material". Assistant professor at the Department of Physics Ing. Petr Pokorný, Ph.D., received the Rector's Award for outstanding doctoral thesis in 2019 on "Analysis and Application of Optical Elements with Variable and Fixed Parameters". Prof. Milan Jirásek at the Department of Mechanics won the Most Promising Textbook Award 2019 given by Textbook & Academic Authors Association for his book Creep and Hygrothermal Effects in Concrete Structures.

Other important actions and events

The faculty organized or co-organized important conferences, and its representatives attended such conferences. They included the international student conference on applied mathematics and physics, a symposium on construction physics, a multidisciplinary scientific conference on the use of environmentally friendly materials, the 8th International Summer

School of Sustainable Buildings for Europe and the 10th International Conference FIBRE CONCRETE 2019, among others. The faculty has also for the first time organized the competition Hall of the Year Academic 2019 with international attendance. The competition is designed for students at universities specialized in civil engineering. The faculty also co-organized the international competition in architecture INSPIRELI AWARDS.

Third role of the faculty

The faculty actively cooperates with regional administration bodies in the framework of direct cooperation with Prague 6 and the Municipality of Prague, as well as in the framework of operational programmes (OP RDE, OP Prague – Growth Pole). Close cooperation was also established with the Kladno and Buštěhrad regions through the faculty's active involvement in the University Centre for Energy Efficient Buildings CTU. The faculty is also strongly involved in commercial activities. It offers the services of its accredited laboratory, seeks to commercialize intellectual property rights in the form of selling licences for patents and utility models. The programme of cooperation with construction companies in the form of different levels of partnership, which creates a space for mutual feedback between the needs of the faculty and the commercial sector, results in better quality instruction as well as better employability of faculty's graduates.

FCE's person of the year 2019

Ing. arch. Bc. Alžběta Vachelová

Ing. arch. Bc. Alžběta Vachelová, doctoral student at the Faculty of Civil Engineering CTU, founder of the project Sign Up to Change Lives!, received a prestigious award for her initiative focused on donations: in September 2019, she won the 10th edition of the Woman of the Region competition in the Plzeň Region. The project, in which university students sign up as donors to the Czech National Marrow Donors Registry, was launched at the faculty in 2015. Alžběta decided for this type of help to patients after a friend's death. She has organized camps for students of CTU and another seven universities in the Czech Republic. Bone marrow donation saves lives of patients suffering from serious blood diseases, primarily leukaemia. Thanks to her initiative, nearly 3,000 new donors signed up to the registry. Alžběta also received the Ministry of Education, Youth and Sports' award for extraordinary student activity and was nominated for the Via Bona award in the category Young Personal Engagement Award.

Alžběta is currently studying in a doctoral programme at the Department of Architecture and is writing a thesis on the Inclusion of the Design-Build System in Instruction at Universities with a Focus on Civil Engineering and Architecture. This is an alternative to the traditional type of instruction in studios, which strives to more closely link the academic environment to architectural practice and real life. It is a process in the course of which students not only conceive and draw their designs in classes, but they also make physical models of them in 1:1 ratio.

The Faculty of Mechanical Engineering CTU has operated in the research, education and industry markets in the Czech lands since 1864, when independent instruction of mechanical engineering was launched at the Prague Polytechnic. Its activities have remained the same – it preserves and enhances the existing level of knowledge and cultivates creative activity in the form of science, research, development and innovation, provides education and cooperates with industrial enterprises. The significance of these activities is evident when we realize that mechanical engineering lies at the basis of the entire industry. The physical principal of a product's functionality can be also designed by physicists, chemists, software, electrical and civil engineers, but the final product has to be designed and, first of all, produced by mechanical engineers. In this way, mechanical engineering is fundamental for the entire modern industry. And in case of industrial countries, it is the main factor in its economy's sustainability and standard of living. In the past 20 years, the faculty has been building what we today call the ecosystem of cooperation between universities and industrial enterprises in many areas. The ecosystem forms a research and educational background of a university, composed of the knowledge of academic workers, often unique instrumental and experimental platform and study programmes for the education of students in the given field. The aim of building these and other ecosystems on the part of FME is to contribute to the global competitiveness of industrial enterprises in the Czech Republic, which in turn will contribute to Czech Republic's economy and standard of living, and for the country to become a sought-after and attractive country for research, development and production of new high-tech products with a high added value. Our faculty thus becomes a catalyst for the development of Czech industry. An honourable mention of the Visionaries 2019 jury and the faculty's participation in seven of the 13 new National Centres of Competence is an acknowledgment and proof of what was said above.

Prof. Ing. Michael Valášek, DrSc.
Dean, Faculty of Mechanical Engineering, CTU

FACULTY OF MECHANICAL ENGINEERING

Study programmes

In 2019, the faculty started instruction in all renewed and, in accordance with the amended Higher Education Act, newly accredited follow-up master study programmes, in case of which it had also applied for accreditation to teach them in English. The faculty also applied for accreditation of doctoral study programmes, whose structure, however, had to be altered substantially in accordance with the new regulations issued by the National Accreditation Bureau. Last but not least, the faculty applied for accreditation of a new follow-up master programme in Robotics and Production Machinery, which is the faculty's response to the growing importance of robotics in industry and other practical applications. Until now, attention has been mostly given to software and digital robotics; however, the final application must be carried out by a physical robot. Its real properties and deficiencies have to be taken care of for real-life applications. The new study programme offers education that links the IT and physical aspects of robotics.

Projects

The successful completion of the centres of competence projects as well as participating in seven out of the 13 new National Centres of Competence that were launched in the Czech Republic in 2019 is a proof of the faculty's aptitude when it comes to projects. From among the completed centres of competence that were managed by the Faculty of Mechanical Engineering, these are primarily the Centre of Competence for Engineering Production, Centre of Competence for Advanced Technologies for Heat and Electricity Production and the already closed Josef Božek Centre of Competence for Automotive Industry. The launched National Centres of Competence cover automotive and other transportation industries, traditional mechanical engineering, engineering of smart structures, aerospace industry, power engineering, optics and artificial engineering and robotics. In this way, the faculty successfully continues in building ecosystems for different industrial sectors to support the economy of the Czech Republic.

International cooperation

Cooperation between the Faculty of Mechanical Engineering and GE Aviation (USA), the world's biggest producer of aircraft engines, has been a great success. GE Aviation decided to build a Turboprop Centre of Excellence in the Czech Republic, where turbo engines will be both developed and produced. The faculty was asked by the Czech government to enhance its research and teaching competences, which made possible the signing of a collaborative agreement with GE Aviation on cooperation in research and education, i.e. building an ecosystem. This cooperation was established in 2016 and in 2019 an important milestone was achieved when a propeller test cell for trial runs of turbo engines opened. Experiments with the Catalyst turboprop engine were run in the cell. The Catalyst turboprop engine is a breakthrough innovation in the field in the last 30 years.

Awards

In 2019, the faculty received two major awards. One of them was the TA ČR Award in the partnership category for a project of the Josef Božek Centre of Competence for Automotive Industry. Its head, Prof. Macek, accepted the award for long-term outstanding achievements in applied research supporting key industrial sectors of the automotive industry in the Czech Republic. The other award is an honourable mention of the Visionaries 2019 jury given to the faculty for its comprehensive support to socially beneficial applied research and implementation of innovations in the field of mechanical engineering. The faculty was nominated for this competition by the Technology Agency of the Czech Republic for achievements in the field of applied research, including activities such as building the ecosystem with industrial enterprises and creation of innovation for industrial enterprises in the Czech Republic.

Other important actions and events

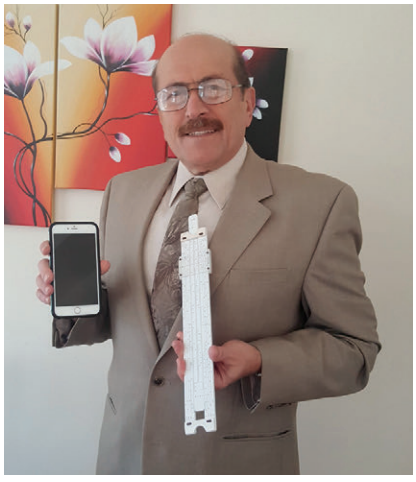
Major scientific events in 2019 included the 15th edition of the prestigious International Conference on High Speed Machining, which was held under the auspices of the Faculty of Mechanical Engineering and sponsored by International Institution for Production Engineering Research (CIRP).

The acquisition of two extraordinary patents also belongs among important achievements in the field of applied research in 2019. One of the patents is called "Equipment for Extracting Water from Ambient Air with Autonomous Operation", which forms the basis of the unique S.A.W.E.R. equipment. It is intended for extraction of water from air in deserts and it will be part of the Czech pavilion at EXPO 2020 in Dubai. The equipment was developed through cooperation between the Faculty of Mechanical Engineering and the University Centre for Energy Efficient Buildings CTU, where the scientists from the faculty work on various research topics.

The other patent is the European patent Method of Controlling Spherical Motion of a Body, which protects the fourth solution of a swing mechanism on a basis of parallel kinematic structures with a large scale of ±100 degrees. Such structures have a limited scale of mobility of ±30–40 degrees, which limits their otherwise advantageous use with high stiffness and dynamics and movement without singular positions. Following the mechanical solutions HexaSphere, EcoSphere and DoubleSphere, TetraSphere is based on the use of redistribution of rotational movements in a redundant spherical mechanism. The real product is based on theoretical computer kinematics.

Inauguration of the propeller test cell in Hradec Králové

Third role of the faculty
The Faculty of Mechnical Engineering systematically creates procedures for the transfer of knowledge to practice. In case of mechanical engineering, this concerns in particular the use of the faculty's innovation potential for industry. Together with our industrial partners we organize innovation brainstorming sessions where we look for ideas for new products, applications and subsequent cooperation. These efforts led to a number of new projects of applied research, and in 2019 they also resulted in the faculty's participation in seven out of the 13 new National Centres of Competence. Once again, the faculty showed that it covers with its competences a wide range of industrial sectors in the Czech Republic.



FME's person of the year 2019

Prof. Nejat Olgac

Based on a proposal of the Faculty of Mechanical Engineering, Prof. Nejat Olgac from the University of Connecticut was awarded a CTU's honorary doctoral degree for his substantial contribution to the development of automated control of mechanical systems, production machines and robots, primarily with transportation delays, created in cooperation with CTU, for his support of the development of high-quality engineering and academic research at CTU during his visits there, and for strengthening mutual relations between universities in the USA and CTU.
Nejat Olgac is an internationally acclaimed scientist in the field of dynamic systems with transportation delays. He is professor of mechanical engineering at the University of Connecticut, USA. He focuses primarily on robotics and machine tools. He met representatives of the Faculty of Mechanical Engineering CTU at the IFToMM congress. In his ALARM laboratory, he worked on how to improve the control of robots, for which he developed sliding mode control. He has supervised several PhD students hailing from CTU. At the same time he also became interested in time-delayed systems. He invented a new concept called Delayed Resonator, an actively tuning vibration absorber. This led him to the field of assessment of stability of time-delayed systems. He regularly visited CTU and invited collaborators and students to the USA. In 2002, he made a breakthrough with his method and proof of exact assessment of stability of dynamic time-delayed models. This had long been a particularly complicated problem to solve.

The Faculty of Electrical Engineering CTU was established in 1950. It currently comprises 17 departments located on the CTU campus in Dejvice and in the historical premises on Karlovo Square. The faculty offers top-quality education in the field of electrical engineering and informatics, electronics, telecommunications, automated control systems, cybernetics, robotics and computer engineering and power engineering.
The year 2019 brought a lot of changes and achievements for the faculty. On 1 July 2019, I took on the role of the faculty's dean after Prof. Ing. Pavel Ripka, CSc., who had served as dean for eight years. A new research centre Smart Driving Solutions was created at the Department of Control Engineering.
The most powerful computer cluster for the research of artificial intelligence in the Czech Republic worth CZK 41.6 million was built in the faculty's building on Karlovo Square as part of the RCI project. The Faculty of Electrical Engineering CTU was one of the driving forces behind the initiative prg.ai, in which CTU, Charles University and the Academy of Sciences joined forces with the Municipality of Prague to support high-quality instruction and to bring top scientists in the field of AI to Prague. The Avast AI and Cybersecurity Laboratory (AAICL) was established at the faculty.

Prof. Mgr. Petr Páta, Ph.D.
Dean, Faculty of Electrical Engineering, CTU

FACULTY OF ELECTRICAL ENGINEERING

Study programmes

All programmes are closely linked to research activities. The teacher-student ratio at the faculty is only 1:7. Therefore, we have plenty of time to work with students on individual basis within semester projects and bachelor and master theses. The majority of student theses are further used in research, development and application projects.

Students from 50 countries studied in study programmes at FEE and another more than 400 students studied at FEE during short-term study stays. In the 2018-19 academic year students enrolled in the first year of both bachelor and master studies in the new study programme in Medical Electronics and Bioinformatics. We are gradually opening innovated doctoral study programmes in: Acoustics, Applied Physics, Bioengineering, Economics of Power Engineering and Electrical Engineering, Electrical Engineering and Communication, Cybernetics and Robotics, Aerospace Technology. In cooperation with partner universities, we offer double degree and joint degree programmes with RWTH Aachen, Tomsk Polytechnic University, the National Taiwan University of Science and Eurecom Sophia-Tech – Grenoble Institute of Technology, and students can also study in the Space Master programme run together with Luleå University of Technology and the University of Würzburg. We entered into talks with Kazan Federal University concerning extending the double degree programme in computer science and applied mathematics.

Projects

Same as last year, the trend in the number of submitted patents and utility models applications was increasing. In 2019, the faculty acquired eight utility models, nine Czech patents and 10 international patents. A total of 30 new research outcomes were submitted for patent protection.

As part of additional activity, staff at the faculty dedicated not only to contracts on research and development for industry. Projects whose worth totalled CZK 101 million included 160 contracts worth up to CZK 1 million and 81 contracts worth over CZK 1 million. 27 courses and training sessions were carried out, seven expert reports were registered and four were prepared. In 2019, a total of 295 grant projects were conducted, of which 24 were international projects, 154 Czech projects, 29 were supported from structural funds and 88 were projects of student grant competition. The most important of them included: EU grant H2020 AERIAL-CORE: AERIAL Cognitive Integrated Multi-Task Robotic System with Extended Operation Range and Safety – Dr. Martin Saska's project team; ERC.cz grant supervised by doc. Ondřej Chum on Generalized Image Retrieval and Relation Discovery; support from GAČR to Dr. Matěj Hoffmann in the framework of projects of excellence in basic research – EXPRO for tasks using cognition of the whole body surface for safe and natural interactions: from brain to collaborative robots. Our experts developed a simulator that changes the way of training of operators at the 155 emergency number – the system emulates the development of emergency situations operators at emergency call centres have to deal with; the Prague Rescue Service uses this new solution

International cooperation

Also in 2019 the faculty developed cooperation with partners around the world. Scientists at the Department of Control Engineering developed a special coating which found its first practical use in aeronautics industry in the technology of production of components for Airbus A320 and other aircraft. We collaborate with Mayo Clinic on non-invasive blood pressure monitoring for treatment and suppression of hypertension. Projects within international consortia continued, including: IMOVE – Unlocking Large-Scale Access to Combined Mobility through a European MaaS Network, ELECTRIFIC – Enabling Seamless Electromobility through Smart Vehicle-grid Integration, and SESAR – Controller Tools and Team Organisation for the Provision of Separation in Air Traffic Management.

Awards

Libor Bukata at the Department of Control Engineering received the Werner von Siemens Award for his dissertation thesis – first place in the category of thesis on the concept of Industry 4.0, to which 114 nominations were submitted. Přemysl Šůcha supervised the thesis. Jan Filip won second place in the same competition with his diploma thesis whose aim was to predict the trajectory of an autonomous vehicle; in the past, Jan Filip was also awarded by ABB and is currently working as a developer at Porsche Engineering. Karel Durkota at the Department of Computer Sciences was 2nd in the 2019 Joseph Fourier Prize with his dissertation thesis focused on the application of algorithms in the theory of games in network security safety. Bc. Šimon Mandlík, student of the Open Informatics programme, won the Upsilon Pi Epsilon scholarship. In the IT SPY international competition, Jan Bayer came 1st with his diploma thesis – a design of an algorithm for an autonomous rescue robot. Prof. Jiří Matas at the Department of Cybernetics won a special award in the AI Awards 2018 project. The faculty's Dean presented the Trnka medal to Prof. Ing. Milan Mikulec, DrSc, for his contribution to FEE. Prof. Mikulec was a close collaborator of Prof. Trnka and is the author of fundamental textbooks on the circuit theory. Prof. Mikulec has always been a moral authority for his colleagues and students. Ing. Vojtěch Kumpošt and doc. Petr Habala received the 2019 awards of the Ministry of Education, Youth and Sports in the field of higher education, science and research.

Other important events

The Energy Olympics, the Robosoutěž competition, FELfest and FELCamp for high school students were held at the faculty. We organized summer schools (e.g. the IEE RAS Summer School on Multi-Robot Systems) and scientific conferences, of which the largest was


TADY JSTE SPRÁVNĚ!
FEL ČVUT

EuMCE. As usual, we joined the Open House Prague, Night of Scientists and the Science Fair. Thursdays with Physics were awarded by the Czech Physical Society – Union of Czech Mathematicians and Physicists for continuous extraordinary activity in popularization of physics.

Third role of the faculty

The faculty's activities have an impact on the industry in the Czech Republic and abroad; the faculty is a consultant in the field of electrical energy distribution; selected employees work on commissions in the field of electrical engineering or video game industry. We also started to significantly participate in applied research in the field of cybersecurity. We cooperate with industrial partners in the field of sensorics, automation and measurement data processing; we are proud of our results in computer image processing. With regards to light current electrical engineering, we are active in telecommunications, radioelectronics and more specifically in satellite navigation; we have excellent results in antenna technology. In the long-term, we have been particularly successful in computer graphics for both video game and film industries. The Centre for Advanced Photovoltaics (CAP) was established at the faculty four years ago. As part of its expert activities in the accredited laboratory of diagnostics of photovoltaic systems, CAP carries out diagnostics of these systems for large commercial subjects, banks and courts. Based on contracts, we conduct technical tasks for other automotive leaders, such as Škoda AUTO, Valeo and Toyota. We have established ourselves in cybersecurity, where the Artificial Intelligence Centre (AIC) at the Department of Computer Science plays an important role.

FEE's team of the year 2019

wITches

wITches, a group of volunteers from among female students at the Faculty of Electrical Engineering CTU, teaches children the basics of IT and electrical engineering. They organize workshops for children aged 10 to 15. Currently, wITches offers five different topics – construction and programming of robots from LEGO MINDSTORMS, basics of programming in SCRATCH, basics of electrical circuits with BOFFIN, basics of programming and algorithmization with OZOBOT robots and basics of electrical engineering with a programmable microcomputer MICRO:BIT. They organized visits to IT and tech companies so that children could see how things work in practice. The students manage the programme and aids, the management and development of web applications and graphic design of PR materials themselves.
The vision of wITches, which had 18 members in 2019, is to show children what can be achieved using technology and what work they can do in the future. They learn theoretical basics at school, but they also have to have an idea of how they are used in practice. They see with their own eyes that things are not as complicated as they seem to be at first sight. Children can see that after a few hours spent at a workshop, they can create beautiful things.
Since 2016, when wITches was established at the Faculty of Electrical Engineering, 941 children have attended its workshops, of which 18 were from children's homes. Almost a third were girls.

The Faculty of Nuclear Sciences and Physical Engineering, CTU in Prague, has two basic aims: to educate top specialists for both practice and science, and to contribute to scientific development in all disciplines that the faculty focuses on. We believe that thanks to the decision taken by the government to build new nuclear units in the Czech Republic, the interest in our area of expertise will grow. We already started preparations for a second university fission nuclear reactor several years ago. Based on the faculty's name many people believe that we deal solely with nuclear issues, but nothing could be further from the truth. We are of course closely connected with nuclear power, but at the same time we also have close links with top mathematics, materials, chemistry, lasers, nanotechnologies and information technology. The achievements of our teachers, scientists and students prove that we are a top workplace, and not only in the context of the Czech Republic. This is further supported by the fact that four of our employees are among the most cited staff at CTU based on data from Web of Science – and two of them are in the top two places! The connection between science and education is strongly supported at the faculty. A relatively high number of graduates from master study programmes continue to study in doctoral study programmes. Here, the Centre of Advanced Applied Sciences (CAAS) coordinated by the faculty plays an important role. We established the centre at the end of 2018 and it gained full traction in 2019.

Prof. Ing. Igor Jex, DrSc.
Dean, Faculty of Nuclear Sciences and Physical Engineering, CTU

FACULTY OF NUCLEAR SCIENCES AND PHYSICAL ENGINEERING

Study programmes

In 2019, the faculty began to renew accreditations of the existing study programmes and to prepare new study programmes focused on quantum technologies, decommissioning of nuclear facilities and application algebra and analysis. These areas are now developing rapidly, which means the faculty will extend the study possibilities and acquire new study applicants.

Projects

The Centre of Advanced Applied Sciences (CAS, registration number CZ.02.1.02/0.0/0.0/16_019/0000778) established at the end of 2018 and managed by the Faculty of Nuclear Sciences and Physical Engineering CTU, is the faculty's most important project. Its main aims include the integration of basic and oriented research in various scientific disciplines and the creation of an efficient environment for interdisciplinary research. The centre is financed from the EU operational programme Research, Development and Education. The overall budget of the five-year project is CZK 550 million. 350 leading experts are involved in the project, including junior scientists and students from 6 CTU faculties (the Faculty of Nuclear Sciences and Physical Engineering, the Faculty of Civil Engineering, the Faculty of Mechanical Engineering, the Faculty of Electrical Engineering, the Faculty of Architecture, the Faculty of Information Technology) and the J. Heyrovsky Institute of Physical Chemistry. The project team at the faculty, which coordinates the individual activities, is headed by the director of the project, Prof, Ing. Igor Jex, DrSc, dean of FNSPE.

A number of students continue to study in doctoral study programmes, helping in this way to develop scientific activities. However, the faculty faced problems with available space for its staff and students, so already in 2018, it opened new offices in the loft of the building on Břehová Street and started with the conversion of the loft also in the building on Trojanova Street. The newly built offices on Trojanova Street welcomed new tenants – doctoral students in 2019. In addition to the new offices, a big part of the art nouveau building was renovated and now it houses the Department of Humanities and Languages, the Department of Physical Electronics, the Department of Mathematics, the Department of Materials and the Department of Software Engineering. Also two new external lifts will facilitate the movement in the building for employees and visitors alike.

International cooperation

The faculty participates in a number of international scientific projects. Faculty's staff and students are also involved in research in CERN, Switzerland, and in ITER in France, BNL in the USA and more. The faculty or its staff are members of several dozen professional associations and collaborate with over a hundred Czech and international organizations and companies. Every year, FNSPE organizes or co-organizes various conferences, seminars and workshops on the faculty's premises or elsewhere.

Awards

One of the two CTU Rector's Awards for outstanding doctoral thesis of 2017 was given at the start of 2019 at a formal sitting of the CTU Scientific Council at the Bethlehem Chapel to RNDr. Ing. Petr Distler, Ph.D. et Ph.D., scientist at FNSPE. He was given the award for his dissertation thesis on the Study of Extraction Systems for Separation of Lanthanoids and Minority Actinoids, which is part of a European project that aims to close the nuclear fuel cycle.

Nobel laureate Jean-Marie Lehn, founder of supramoluecular chemistry, handed over the 2019 Becquerel Prize awarded by the French Embassy in the Czech Republic. Two representatives of FNSPE received the prize in the National Museum: Ing. Martin Ševeček, PhD., and Ing. Martin Cesnek.

Other importatn activities and events

The faculty increases the number of events that aim to present the possiblity to study at the faculty. In addition to successful and popular events such as Be a Particle Physicist for One Day, or Be a Medical Physicist for One Day, 2019 saw the premiere of Be a Reactor Physicist for One Day organized by the Department of Nuclear Reactors. After a theoretical introduction, participants visited the fission nuclear reactor and conducted own experiments there. At the end of January 2019, the first edition of the seminar on Mathematics for Life was organized by the FNSPE Department of Mathematics in cooperation with the Faculty of Education, Charles University. Thanks to certification of Further Education of Pedagogical Staff and an attractive programme, the interest was huge and the lecture hall on Trojanova Street could not accommodate all visitors. However, all lectures were recorded and made available (albeit a bit later) to all those interested. Teachers and other participants had only words of praise for the event.

In the autumn of 2019, the faculty also launched a seminar designed for high school teachers of chemistry and their students called Chemistry at CTU (apart from FNSPE, also the Faculty of Civil Engineering, the Faculty of Electrical Engineering and the Klokner Institute CTU participated in the seminar). The seminar lasted one day and included lectures and practicals prepared in cooperation with the Learning and Teaching Centre LETEC and it was accredited in the framework of Further Education of Pedagogical Staff; the response was very positive.

Third role of the faculty

In the framework of scientific, research and pedagogical activity, the faculty cooperates with a number of Czech and international institutions and companies. Contacts are developed based on contracts and protocols on cooperation between foreign institutions and CTU.

The faculty also has a long history of cooperation in research with the industrial sector, with companies such as Aero, ČEZ, ČZ, GE Aviation, Honeywell, Nuvia and Škoda JS, to name just a few. In addition to joint development, this includes also supervision of student theses, internships and cooperation in recruitment.

Unique detectors developed at FNSPE were sent to the Earth's orbit in July 2019. They were transported there by Russian Soyuz 2.1b/Fregat launch vehicle as part of Socrat-R satellite that was developed at Lomonosov Moscow State University. The detectors are placed in the module, which was jointly developed by FNSPE, esc Aerospace and the Nuclear Physics Institute CAS (NPI). The equipment was constructed and produced by Czech company esc Aerospace, with contribution from FNSPE and NPI. The detector monitors space weather and the radiation field around the Earth. Information obtained during this mission will be used for verification of space radiation models used to calculate the radiation dose for satellites and spacecraft crews and further improvement of developed space instrumentation.

FNSPE's person of the year 2019

RNDr. Ing. Petr Distler, Ph.D. et Ph.D.

Petr Distler, a junior scientist at the Faculty of Nuclear Sciences and Physical Engineering, was one of the two recipients of the CTU Rector's Award for outstanding PhD thesis. He was given the award for his dissertation thesis on the Study of Extraction Systems for Separation of Lanthanoids and Minority Actinoids, which is part of a European project that aims to close the nuclear fuel cycle. In other words, it deals with processing nuclear waste from fission reactors that will enable its repeated use and will dramatically decrease the time for which radioactive waste will need to be stored in deep underground repositories, posing risk for the environment.

"Radiotoxicity of spent nuclear fuel will spontaneously drop to the level of uranium ore, from which the fuel was made, after about 300,000 years. The current method for reprocessing of nuclear fuel has decreased the time to 10,000 years; however, that's not enough. Under our project we are working on a concept of Partitioning and Transmutation, which would shorten the time to approximately 300 years. Simply put, we extract components with high radioactivity and longer half-life of transformation from nuclear waste that can be further used or transmuted to components that are stable or have short half-life of transformation," explains Petr Distler. Consequently, the volume of nuclear waste will be much smaller and at the same time natural resources will not be wasted. For his research on nuclear waste transmutation, on which he had focused from his bachelor thesis up to his dissertation thesis, he also received other awards, including first place in the Becquerel Prize for Nuclear that was handed to him personally by Nobel laureate in Chemistry, Prof. Jean-Pierre Sauvage at the French Embassy with two other French Nobel laureates in attendance.

In 2019, we commemorated the 30th anniversary of the Velvet Revolution, which restored democracy and freedom also in study, work and entrepreneurship. Looking back to history reminds us of the complexity of our past and warns us that we should not take the current period of peace, freedom and prosperity for granted, with no need from us to protect it and take good care of it. Increasing complicatedness, fragmentation and interconnectedness of the process of designing and preparing construction projects, towns and villages and the landscape, make it ever more difficult to maintain the comprehensiveness and integrity of education in these disciplines. It is not only necessary to have the ability to obtain all the information that is needed, but also to learn how to sort it out and assess it with the aim to absorb and use just the relevant information. We will be required to keep the distance and put things into perspective to be able to maintain integrity of opinions and human dimensions in order to not lose the sense and long-term aims of our activity as we are overwhelmed by the amount of information, requirements and regulations. Paradoxically, the importance of universality of education in generally focused disciplines may even be growing with the increasing complexity and lack of clarity in the world that is changing and developing faster than ever. In the world dominated by specialization, architects will become specialized in universality and wholeness of how they perceive the creation of built environment and the landscape. Especially in disciplines that require a complex perspective and universal foundations, it will be ever more important to educate not for certainty, but rather to prepare for uncertainty. To teach students not to look for certainty of predetermined facts and procedures. It will be crucial to search for understanding of the sense and connections that will allow to freely manage and solve new assignments and changing circumstances that take us by surprise. Growing scales and intertwining of disciplines in the work of architects, urban architects and landscape architects and in a sense also designers is yet another inherent part of today's reality to which instruction should be able to respond. This is why we are preparing a joint study programme in architecture, urbanism and landscape architecture and the annual congress of the European Association for Architectural Education EAAE 2020 focused on this topic.

Prof. Ing. arch. Ladislav Lábus, Hon. FAIA
Dean, Faculty of Architecture, CTU

FACULTY OF ARCHITECTURE

Study programmes

The faculty provides comprehensive education in three study programmes. Architecture and Urbanism focuses on basic knowledge covering design of buildings and creation of the environment. It provides basic education in disciplines that have a direct impact on the work of architects: historical, cultural and social development, history of architecture and civil engineering, introduction to exact sciences, development and current state of technical solution of buildings, typology of buildings and the relationship between architecture and the needs of society and the current development in aesthetics, economics, technology and social conditions.

Landscape Architecture is a relatively new study programme. It is a discipline which is rapidly developing around the world. Its importance for the quality of the environment is growing as our world is getting more urbanised.

The third programme in Design turns out flexible and thoroughly educated designers, specialists that know their way about the current technologies and media, and are able to respond to the requirements of the current labour market. Since design is a multidisciplinary field, interdisciplinary cooperation and participation in real-life projects of other CTU faculties is an important aspect.

Projects

The Faculty of Architecture is involved in a number of scientific research projects of both basic and applied research. A three-year GAČR grant called Principles for Creating Environment for People with Parkinson's Disease (investigators Jan Tomandl and Irena Šestáková) is implemented in cooperation with the Neurological Clinic and the Centre of Clinical Neuroscience of the First Faculty of Medicine, Charles University, and the General University Hospital in Prague. Based on the results of the research, a book was published in Czech and in English under the title Design of Space for People with Parkinson's Disease. The book is supplemented with video materials showing selected manifestations of typical symptoms of Parkinson's disease. Especially medical doctors and other experts showed particular interest in the research, and in 2019, an article was published in the Movement Disorders journal under the title Pavement Patterns Can Be Designed to Improve Gait in Parkinson's Disease Patients.

The faculty is the main investigator in three extensive NAKI projects: Architecture in the Czech Republic in the 1980's. Individuality, identity and parallel thoughts during the period of so-called normalization (Prof. Petr Vorlík), Industrial Architecture. Monuments of industrial heritage as technical-architectural work and as the identity of a place (Lukáš Beran), and Origin and Attributes of Heritage Values of Historical Towns in the Czech Republic (Prof. Jan Jehlík).

International cooperation

In the field of international cooperation, the faculty carried out a number of projects and organized a number of events. Landscape architect Prof. T. Rehwaldt from Germany, leading Slovenian architect Prof. V. Perović and renowned Czech-German architect and professor at the Faculty of Architecture, RWTH Aachen, Prof Mirko Baum were valuable additions to the teaching staff at the faculty.

In cooperation with the Sto-Stiftung Foundation we organized the 5th edition of the series of lectures by top international architects called November Talks, in this way being partners to leading architectural schools in Europe in Stuttgart, Graz, Milan, Paris, London, Madrid. The faculty is active in many international organizations, it prepares the Annual Conference and General Meeting of the European Association for Architectural Education (EAAE) and within this organization, it held an international workshop as part of the EAAE Thematic Network Conservation activity.

Awards

Teachers and students at the faculty received a number of awards in 2019. Václav Girsa at the Institute of Monument Care was given the Jože Plečnik Award 2019 as recognition of his work in preservation of monuments. Ján Stempel received the prestigious Association of Hungarian Architects Award for his contribution to recognition of Hungarian architecture.

Our teachers also received several awards at the 26th edition of the Czech Architects Grand Prix: Ondřej Císler for his footbridge across the Dřetovický brook in Vrapice near Kladno, Petr Hájek for the Centre for Contemporary Art DOX+ in Prague and for the renovation of the Old Water and Observatory Tower in Prague 7, Ján Stempel and Jan Jakub Tesař for the Bell Tower in Bílovice-Lutotín. The Corso under the Lime Trees on the Jiří z Poděbrad Square in Řevnice by Lukáš Ehl, Tomáš Koumar and Alena Šrámková won the Czech Architecture Award 2019. Michaela Brožová, Jan Fišer, Václav Girsa, Till Rehwaldt and Zdeněk Rothbauer received the Medal of the Faculty of Architecture for significant contribution to and impact on the development of the faculty.

Šárka Malošíková was given the Stanislv Hanzl Award for best students at CTU for promoting design-build methods of instruction in architectural education. Miroslav Pavel was presented the Josef Hlávka Award for outstanding doctoral dissertation thesis under the title Architect Jindřich Merganc: Humane Dimension. Students received a number of prestigious awards. Anna Svobodová, Ondřej Blaha, Sausan Haj Abdová and Barbora Červeňová were given the Young Architect Award 2019 for a Residential Building in Karlín. The same prize was also given to Filip Hermann for the project Český Krumlov – Housing Estate.

Students of the study programme in Design got several awards in a strict and demanding competition for designers National Award for Student Design 2019: Magdaléna Fousová for a healthy toilet FoRest, Tomáš Havel for a porcelain resophonic guitar, Kryštof David for a universal salt water lamp UL, Mariana Kopecká for a detached washbasin with accessories, Lucie Horáková for an interior

light Tubo and Kateřina Rydlová for warm textile points Moody. Two students of this programme also succeeded in the international competition Best in Design for designers under 30: Lucie Horáková was named the overall winner and she also came first in the Product Design category for her design of an interior light TUBO. Her classmate Martin Štosek won second place in the same category with his design of a door handle U.
Tereza Vacková, student of the programme in Design, received an award at the Taiwan International Design Competition 2018, the biggest international design competition for students, for her bachelor thesis CleS – Clever Seek in the category International Design Association Special Prize.
Students of the programme in Landscape Architecture Olga Lebeděva and Dominika Tesárková won first and third place, respectively, in the Architect Antonín

Raymond Award.

Other important actions and events The Faculty of Architecture commemorated the 30th anniversary of the Velvet Revolution. To celebrate this occasion, it organized an event to which it invited students, teachers, alumni and friends of architecture. Ladislav Lábus, dean of the faculty, inaugurated the book called "30 let svobody. Rozhovory o architektuře a společnosti" (30 Years of Freedom. Interviews on architecture and society) on this occasion, and a Rolling House was unveiled at the faculty's patio, which the students built based on American architect John Hejduk's designs to commemorate his 90th anniversary.

Third role of the faculty

The faculty has a tradition of establishing mutually beneficial cooperation with public and private sector, when students have the opportunity to implement original ideas and at the same time enhance the quality of public space. After a successful cooperation last year when students made a footbridge in Krkonoše, the Administration of the Krkonoše Mountains National Park tasked them with designing and building six mountain refuge huts (the project was funded by CTU and the KRNAP Administration). The project was welcomed by many companies who contributed financially or by offering technical consultations. Some companies even let the students use their production capacities and consult their experts. In addition to the huts, our students also created a small mobile information kiosk for the KRNAP Administration.

Another student project carried out as part of instruction was a tower with a view in Libčice nad Vltavou, which was prepared in partnership with Skanska Reality a.s. as an initial construction project in an area that shall soon become a residential park.
One of the outcomes of a long-term cooperation between the faculty, a student start-up PET-MAT established at FA CTU, Karlovarské minerální vody and the Ministry of Industry and Trade of the Czech Republic is the realization of the winning project of the student competition Digital Factory: the sculpture called Kaleidoscope by our student Ekin Ünlü. The sculpture, which is made by 3D print from recycled plastic, was auctioned at the International Engineering Fair in Brno 2019 with minister of trade Karel Havlíček in attendance.

Personality

Alena Šrámková, a leading figure of contemporary Czech architecture, professor emeritus that has taught at the Faculty of Architecture for many years, the author of the New Building of CTU, where the faculty is located, and of many other buildings, such as ČKD at Můstek, or the Departure Hall of the Prague main railway station, celebrated her 90th birthday in 2019.

Same as in previous years, the Faculty of Transportation Sciences fulfilled is primary role in the field of transportation in all accredited forms of study. At the same time, it also focused on strengthening the development of know-how and knowledge in the field of transportation sciences and research.

The current economic stability of the faculty is a source of satisfaction. The faculty's dean's office has played an important role in this stabilisation as it is very competent in providing economic and administration services and running the operation of the faculty.

A significant room for the faculty's improvement was identified in the field of excellent results of science and research, so this area was given highest priority, be it in terms of staffing or looking for motivation programmes and projects. The same goes for expert potential. We believe that the implementation of HR Awards principles will support individual personal growth and will result in more appointments of doctors, assistant professors and professors. The life at the faculty is still strongly influenced by ongoing generational exchange, as the incoming young academic workers are taking over responsibility for the implementation of the vision of the faculty's development.

Expert activities performed for state administration and local administration on all levels are of great importance. Broad cooperation dates back to the 1990s, when the faculty was established, and despite the generational exchange it has remained very intense until these days. Also close ties to industry have a long tradition. Thanks to the close cooperation with industry, outside experts very actively participate in project instruction of our students. CTU Lions – the student motorcycle racing team is a great example of the results of this cooperation.

A number of challenges are ahead of us, including institutional accreditations, assessment by a foreign evaluation partner, preparation of National Centres of Competence programmes, to name a few. I am confident that as a team we will be able to successfully face these challenges and continue to be a strong, integral constituent part of CTU.

Doc. Ing. Pavel Hrubeš, Ph.D.
Dean, Faculty of Transportation Sciences, CTU

FACULTY OF TRANSPORATION SCIENCES

Study programmes

In 2019, the process of accreditation of a number of bachelor, follow-up master and doctoral study programmes was being carried out at the faculty. For most of them, the reason was the approaching end of the existing accreditations.

However, also a brand new study programme in Smart Cities was prepared and application was submitted for accreditation of a follow-up master as well as doctoral study programme. The programme unites several expert areas that are crucial for future graduates. The competences the students will acquire during their studies include in particular knowledge in the field of transportation systems and technologies, systems science, logistics, management, urban planning and concepts of so-called smart cities. The follow-up master study programme in Smart Cities was prepared in cooperation with the Faculty of Architecture CTU as a result of long-term conceptual activities in this very topical area, and also in cooperation with the University of Texas in El Paso (UTEP). The instruction will be in the form of a double-degree programme at the two partner universities.

Projects

Major projects carried out in 2019 included the EU 2020 – MAVEN project (Managing Automated Vehicles Enhances), funded in the framework of the EC Horizon 2020 Research and Innovation Framework Programme, Grant No. 690727. This three-year project unites nine partners from four EU member states, including the Faculty of Transportation Sciences CTU. The aim of the project is to provide solutions for autonomous vehicles in cities with controlled crossroads and mixed (non-autonomous) traffic. The project is focused on creating and implementing algorithms for the organization of the flow of autonomous vehicles communicating with the transportation infrastructure and structuring the negotiation processes between vehicles and the infrastructure. So-called platooning (creation of groups of autonomous vehicles) is a concrete example of technologies used in this area. MAVEN aims to improve the use of the infrastructure's capacity and emissions reduction.

The project has clearly proved that the right integration of CAV into city transportation management can, among other things, help meet environmental targets and reduce CO2 emissions by up to 12% (combination of GLOSA and signal optimization). Together with the green wave, crossroads capacity was increased by 34%. For lower level of penetration (20% CAV penetration), a significant improvement in the transportation performance is achieved. For instance, platooning leads to CO2 emissions reduction by 2.6% or the impact indicator by 174.7%.

Thus, the MAVEN project provides an answer to questions concerning the integration of autonomous vehicles into urban infrastructure and existing control systems. Same as today, control and management systems in transportation will have coordination and sometimes also decisive impact on the dynamic of the transportation flow in the future, primarily with respect to optimization of the whole transportation network.

International cooperation

In the framework of long-term cooperation with the University of Texas at El Paso, we have been implementing a Dual Master Degree Programme in Smart Cities that will continue until 2024. At the same time, accreditation of the master study programme in Smart Cities (SC) taught in English was being prepared in 2019; the programme will be launched in the 2020/2021 winter semester (together with UTEP).

Cooperation with TU Berlin is now also being developed in the field of autonomous mobility and smart cities, primarily in the form of joint projects in the field of smart cities.

Awards

Prof. Dr. Ing. Miroslav Svítek, dr. h. c., holder of the gold Felber Medal for development of CTU, was appointed "Personality of Smart Cities" in 2019 by the minister for regional development for his active support and development of applied research using new findings in the implementation of the Smart City concept in the Czech Republic.

The CTU Lions team did very well in the MOTOSTUDENT series. New members were accepted to the team at the start of the year just in time before the beginning of the new season. Within the MEC – Moto Engineering Cup series, they competed at the Moto GP in Albacete and at the race track in Barcelona (Circuit de Barcelona-Catalunya), where they pitted against the best teams in the Motostudent competition. They placed third in the series. At the end of the year, they focused on the development of another electric motorcycle, where the electromotor presented them with the greatest challenge of all (for more, visit http://www.ctulions.cz or FB:@ctulions).

Other important actions and events

The fourth edition of the IEEE Smart Cities Symposium Prague was held in 2019, with significant international attendance and proceedings indexed in Scopus and WoS. At the same time, the Faculty of Transportation Sciences held the third edition of the Smart Cities Student Workshop for students from the University of Maryland (1st and 2nd editions), UTEP (3rd edition) together with students from FTS CTU.

Third role of the faculty

Although the faculty is going through a major generational exchange, the intensity of cooperation with state and regional administrations remains unchanged. Also close ties to industry have a long tradition and thanks to the close cooperation with industry, outside experts very actively participate in project instruction. The faculty is an important professional authority in the field of transportation.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FTS's person of the year 2019

Prof. Dr. Ing. Miroslav Svítek, dr. h. c.

Professor Miroslav Svítek is a leading, internationally acknowledged expert who focuses on the design and modelling of complex systems. The former dean of the Faculty of Transportation Sciences (he headed the faculty in the years 2010–2018) and current president of the Czech Smart City Cluster introduced the topic of smart cities to the faculty already in 2014, when awareness of the topic was relatively small and its understanding mostly strictly technical. The faculty's view of the topic has been different from the start. Since its establishment in 1993, the Faculty of Transportation Sciences has used the system approach and so the topic of Smart Cities very well fit its scientific and later on also teaching portfolio. In addition to accentuating the system approach, focus was put also on the human dimension of Smart Cities as cities for people and the meaning of the word smart was understood as finding a balance between technological and human dimensions.
In application research, Prof. Miroslav Svítek focuses on the implementation of complex telematics systems within the concept of Smart Cities. He is a visiting professor at the University of Texas at El Paso (UTEP), USA, member of the Engineering Academy of the Czech Republic, head of working group Clean Mobility under the Czech Business Council for Sustainable Development (CBCSD), member of the Prague City Assembly Committee for Smart Cities Development and the Coordination Council of the Minister of Transport for Intelligent Transportation Systems, among others. He has been involved in management of many Czech and international scientific and research projects.

The Faculty of Biomedical Engineering CTU is a modern, internationally respected and sought-after research faculty that is on par with other faculties of biomedical engineering in Europe. It offers students in both full- and part-time form of study high-quality education in all its bachelor, master and doctoral study programmes.
The faculty is unique in that it follows three different directions. It provides education in biomedical engineering with a wide range of post-gradual career opportunities, a broad spectrum of health care disciplines with a direct link to job opportunities in treatment and preventive care and currently very popular education in rescue disciplines.
This "triality" of the faculty is held together by an effort to maximally connect the basis of all disciplines in order to turn out broadly educated graduates that are successful on the labour market and able to adapt to the changing requirements in society.
The faculty opens its fields of study also to foreign students and meets the needs of professional associations. The faculty's vision in the field of research and innovation is to develop research work at national and international levels and systematically head towards the parameters of a research faculty. Therefore, we strengthen our position in cooperation with industry, the health care system and the public administration and create conditions for increased innovation potential and transfer of technology and knowledge.
This perspective is vital for the faculty, but at the same time it is extremely demanding and time-consuming. In all our visions we must respect several specific features of the faculty. We are one of the youngest faculties of the university, we are also a regional faculty in Kladno and the Central Bohemian Region, and last but not least, we develop disciplines that are not always the "golden fund" of CTU. On the one hand, this brings evident advantages; on the other hand, it also causes problems in creation of scientific and pedagogical teams, building unique laboratories, establishing ties between the faculty and industry and the faculty and the public.

Prof. MUDr. Ivan Dylevský, DrSc.
Dean, Faculty of Biomedical Engineering, CTU

FACULTY OF BIOMEDICAL ENGINEERING

Study programmes

A large part of the fields of study at the faculty prepare students for working in regulated jobs within non-medical health care professions and for conducting activities linked to provision of health care. They include the following fields of study: Biomedical Technician, Optics and Optometry, Physiotherapy, Radiological Assistant, Medical Rescuer, Medical Laboratory Technician and Biomedical Engineer. All these fields have received an approval of the Ministry of Health of the Czech Republic and our graduates are almost 100% successful on the labour market.

We also implement Joint/Double/Multiple Degree programmes in cooperation with foreign universities (Aachen, Brussels, Dublin, Groningen, etc.)

Projects and awards

The faculty actively supports the development of research activities in all forms. The "Motivation Directive for Staff at FBME" includes financial motivation for active submission of research grants and activities leading to personal career growth of academic workers, among other things. Multidisciplinary personnel, instrumental and material support to implementation of multi-year grants, project oriented cooperation with leading clinical workplaces and participation in research projects and centres are among the faculty's top priorities. In the last year, a total of 14 scientific and research teams worked at the faculty. Academic workers, including doctoral students authored or co-authored dozens of impacted and indexed papers. Also relationships with the application sector are actively developed, as evidenced by two successfully completed projects of contractual research and awarded patents. Also students were involved in research, as is the tradition at FBME. In the CTU Student Grant Competition, they received several dozens of new grants. Other grants were funded from GAČR, TA ČR, the Ministry of Health, the European Commission, etc.

Due to the faculty's location, inter-departmental cooperation is focused mainly on the Central Bohemian Region. FBME's partners include the Rehabilitation Institute Kladruby, the Regional Centre of Rescue Service of the Central Bohemian Region, the hospitals in Slaný and in Rakovník, companies LINET, spol. s r. o., and BEZNOSKA, s. r. o. This cooperation is in the form of practical trainings for students, commissioning and supervision of bachelor and master theses; experts from these companies also teach at the faculty. Further, we also cooperate with CLEVERTECH and FLEXICARE based on contracts on cooperation to support research activities.

The faculty is a member of the European Alliance for Medical and Biological Engineering and Sciences (EAMBES) and the Association of University Educators of Non-Medical Health Care Professions in the Czech Republic (since 2016). This membership means that the faculty can actively participate in the association's activities, get access to the information from other faculties in the Czech Republic that implement similar accredited study programmes.

Junior employees and doctoral students are the faculty's future. Just last year, more than 10 students and graduates received awards at various Czech and international conferences, competitions, races, etc. The list of such activities would be very long, from a thesis entitled The Effect of Change of Inspired Oxygen Fraction upon Peripheral Oxygen Saturation in Premature Infant: A Mathematical Model Enhancement (authors L. Tejkl and V. Huttová) to publications by the Unconventional Ventilation Team to participation and honourable place at the Olympics in Chungju, South Korea. Bachelor student graduating from the field of study Biomedical Technician Bc. Barbora Balcarová received the Josef Hlávka Award. Mgr. Slávka Vítečková, Ph.D., student of the doctoral study programme in Biomedical and Clinical Technology was presented thea S. Hanzl Foundation Award the aim of which is to support talented students in study programmes accredited at faculties and university institutes at CTU.

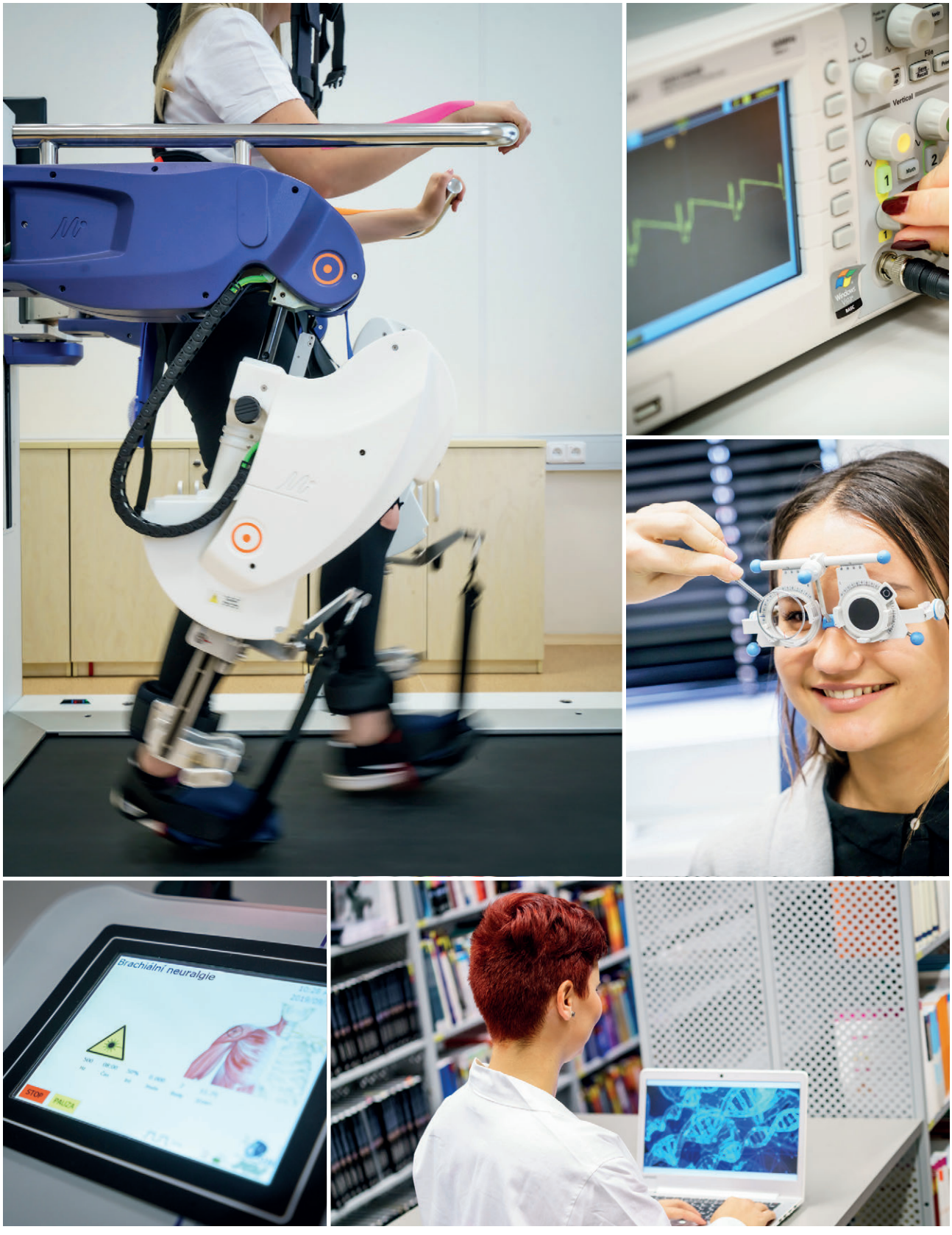
Third role of the faculty

The assessment of the faculty's work in the field of transfer of knowledge to practice is defined by the following activities: sales of monographs, studies and analyses, receiving and selling patents, licences and know-how, establishing new spin-offs and cooperation with the existing ones, direct cooperation with commercial entities, i.e. providing services, consultations and commissioned research, joint R&D projects. The possibilities opened before us are huge and we have not yet been able to make full use of them. One of them includes the opportunity for the faculty to work in the region.

Activities in the region

In line with the aims stated in its longterm development plan, the faculty systematically extends social and professional cooperation with the Kladno and Central Bohemian regions as well as developing connections with the companies and customers in the region. Regular internships and excursions of FBME students to public administration organizations, health care centres and professional associations within the Central Bohemian Region and visits of representatives of these organizations at the faculty are an integral part of this cooperation.

Being the only faculty of a public university in the Central Bohemian Region, FBME highly values cooperation with the Central Bohemian and Kladno regions. From a strategic and conceptual perspective, Statutory City of Kladno is FBME's major partner in the region. We cooperate with the city's leadership on issues concerning the development of both the city and the faculty, and on organization of joint expert and social events. The presence of FBME in Kladno increases the importance and prestige of the city as a regional centre of culture and education and has an impact on improving the city's image, the economy of both the city and the region and its attractiveness for housing, and positively affects its demographic development. The faculty welcomes the city's support in addressing spatial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requirements (both for educational purposes and as accommodation for students at the faculty) as well as the city's efforts to help teachers, for instance, by offering lower rental prices in flats owned by the city.

In the Central Bohemian Region, the faculty's partners include the Rehabilitation Institute Kladruby (cooperation in the field of accredited instruciton of physiotherapy), the Regional Centre of Rescue Service of the Central Bohemian Region, the hospitals in Slaný and in Rakovník, companies LINET, spol. s r. o., and BEZNOSKA, s. r. o. With these partners, the faculty cooperates in the field of education (practical trainings for students, commissioning and supervision of bachelor and master theses, employees of these companies also teach at FBME) and in the field of research and development.

The faculty organizes a number of cultural and social events for its students and employees, as well as for the general public. The events with a major social impact include in particular the long-term and successful cooperation with the civic association Halda with whom we organize a series of popular scientific lectures for the general public under the title Science Café in the faculty's building, which has become popular also outside the city and very probably it has led to the increasing number of highschool students interested in studying at FBME.

A thank you from the dean

The text of this Annual Report on Activities of CTU in 2019 is being written in the spring of 2020, in times when a viral pandemic is forever changing the society, its priorities, values and perspectives. Professor Ivan Dylevský, dean of FBME, has this to say: "Either we change, or our civilization has come to an end. This would not be the first time in the history of Europe. Both the university and the faculty are segments of society. We will also have to re-evaluate our position. A number of workers and students at CTU and at FBME have been actively involved in the solution of the problems that have arisen – from innovative respiration solutions to rescuers and students of rescue disciplines working in the field to volunteering. Everybody according to their qualification and abilities. A big thank you to everybody at FBME and CTU!" And regarding future, he adds: "In 2020, the Faculty of Biomedical Engineering CTU is an efficient, successful and innovative institution that wants to belong among the leading faculties in the Czech Republic. This is a result of efforts on the part of employees at the faculty as well as external collaborators. I also extend my thanks to students, primarily those who are not indifferent to the faculty's fate and who are not only good students representing the faculty in teaching, science and sports, but who contribute to the development of our faculty through their ideas and comments."

The Faculty of Information Technology was established on 1 July 2009 as the CTU's 8th faculty, so 2019 marked FIT's 10th anniversary. The faculty now has six departments and one research department built with the help of an ERC grant. The faculty occupies two adjacent buildings on the CTU campus in Prague-Dejvice. The faculty is a nationally and internationally recognized educational, scientific, research and innovation institution. It is open to a modern type of cooperation focusing on information and communication technology. It is consequently able to provide high-quality technical education in the main ICT disciplines on all three levels of education – bachelor, follow-up master, doctoral. The faculty is also accredited to conduct habilitation procedures and procedures to appoint professors. It provides a balanced mix of theoretical background and engineering technical disciplines with a sufficient amount of project teaching and electiveness. This combination leads to the desirable level of individual development of students. We are also actively involved in cooperation with leading industrial, entrepreneurial, research and development institutions, public and state administration. Cooperation with our partner institutions helps FIT follow new trends and offer innovate syllabi and explore new forms of instruction. Collecting feedback from students and its evaluation are an inseparable part of the educational process that is reflected in study materials and organization of studies.
The faculty is a modern and efficiently managed organization with high quality standards in all its activities. Students and employees encounter demanding but friendly environment at the faculty that further motivates them. The faculty is becoming more and more attractive for students, academic workers and collaborating institutions alike.

Doc. RNDr. Ing. Marcel Jiřina, Ph.D.
Dean, Faculty of Information Technology, CTU

FACULTY OF INFORMATION TECHNOLOGY

Study programmes

Three bachelor, follow-up master and doctoral programmes are accredited at the faculty. They are divided into fields of study or specializations. The bachelor study programme has eight fields of study, while the master study programme has 9 specializations. The Doctoral study programme is not further divided into fields – it is built so that it covers all areas of ICT. Study programmes are also accredited in English.

In the three years of the bachelor study programme, students will learn to algorithmize practical tasks, code, think like hackers or analyze image data from cameras. The individual fields include all that ICT has to offer. Already in their first year, students get acquainted with the theoretical basics and elementary principles of this science. Only after that do they choose which ICT branch they want to devote to.

The master study programme in Informatics offers 9 different specializations. Their narrow focus means that they can be studied in depth.

The doctoral study programme in Informatics is focused on the development of students' creative abilities in the whole spectrum of pure and engineering informatics. Graduates will acquire the required combination of knowledge across informatics disciplines (e.g. HW-SW co-design, system design on chip, joint verification of HW and SW designs using adapted or newly created models, modelling of distributed ICT systems).

All study programmes make use of excellent technological equipment, including humanoid robots, drones, equipment for virtual and augmented reality and large-format visualization equipment with 8K+ resolution.

In 2019 new optional subjects were added focusing on virtual reality. In bachelor studies it is a subject called Virtual Reality – An Introductory Course, where original Czech engine NEOS VR is used, and Virtual Gaming Worlds. These are followed by Advanced Virtual Reality in master studies.

Projects

The faculty participates in many projects and grants from various providers (TA ČR, GAČR, EC, CELSA). The most important projects include the Evolving Language Ecosystems (ELE) and the Big Code of Prof. MSc. Jan Vítek, Ph.D., the Image Processing Laboratory of doc. RNDr. Ing. Marcel Jiřina, Ph.D., the Intelligent Embedded Systems Laboratory of Ing. Miroslav Skrbek, Ph.D., and the international project Research Center for Informatics (RCI), in which we participate in cooperation with other CTU faculties.

International cooperation

Through our involvement in the international Magalhaes Network, we are able to enhance mobility opportunities for students and staff at FIT as well as participate in international projects. In 2018, work on the REDEEM 2 project began and the project continued in 2019. The faculty entered into partnership with the University of Antwerp, under which a double degree programme was launched.

Awards

The most important awards given to our staff and students in 2019 included the following: Ing. Tomáš Čejka, Ph.D., assistant professor at the Department of Digital Design, received the Josef Hlávka Award handed out by the Foundation of Josef, Marie and Zdeňka Hlávka. The award is intended for talented students who have shown exceptional skills and creative thinking in their field of study.

Student Bc. Vojtěch Tomas came first in the 20th edition of the Competition of University Students in Scientific Work (SVOČ) in mathematics and physics in section I3 – Computer Graphic Design and Computer Vision with his bachelor thesis on visualization of 3D data from the Sun surface. Ing. Lukáš Brchl, Bc. Karel Čech, Bc. Marián Hlaváč and Ing. Adam Podroužek with their start-up company Dronetag won the main award in the Galileo Masters competition, the most prestigious European award focused on satellite navigation. Doctoral student Ing. Matěj Bartík at the Department of Digital Design and Dr. Ing. Sven Ubik at CESNET received a patent for the system for the implementation of a hash table also in the US.

Other important actions and events

As part of university activities, the faculty participated in events intended for the general public, such as the Museum Night, Science Festival and the Night of Scientists. Several educational activities were also aimed at high school students. The faculty held the second edition of a unique two-week coding course "Introduction to Computer Science" under the guidance of professors and students from Stanford University and the Faculty of Information Technology CTU. Students could take part in the 6th year of the FIKS competition – FIT's Informatics Correspondence Seminar, aimed at helping high school students prepare for studies at the faculty. The Summer IT School Czechitas focused on girls aged 14-19 years also took place on the faculty's premises. The faculty organizes regular conferences such as the Prague PostgreSQL Developers Day (P2D2), InstallFest, LAW FIT, the Prague Embedded Systems Workshop (PESW), the Prague Strinology Conference, StringMasters and LinuxDays.

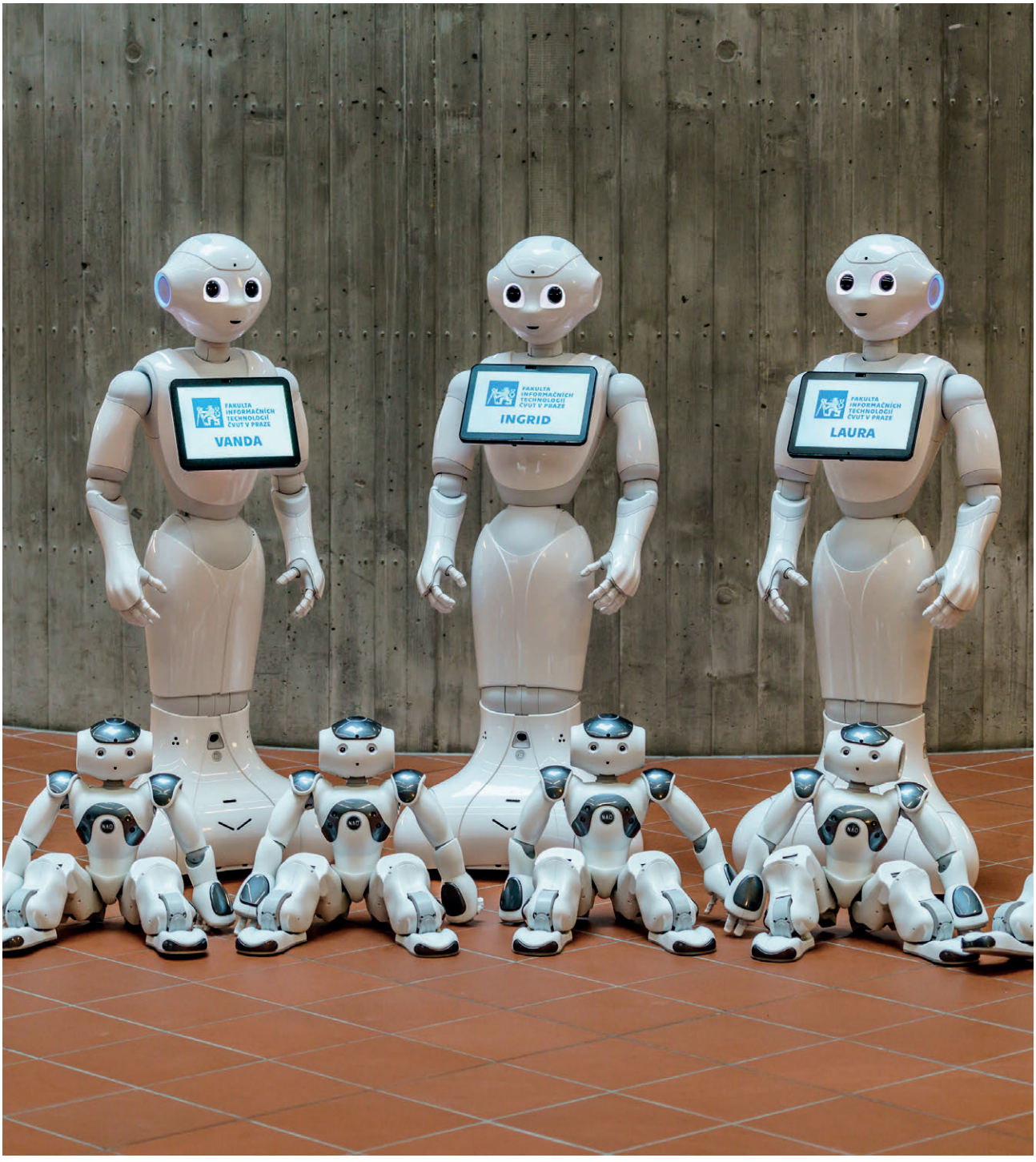
Third role of the faculty

We provide education not only to students in full-time study, but our offer also includes part-time study programmes intended for people who are already working and need a university diploma. In addition, the faculty also organizes lifelong learning programmes aimed at providing additional education again intended for the general public. As part of education, the faculty also welcomes foreign students, both self-funding students and students coming under the Erasmus+ programme, or based on bilateral agreements. The faculty supports education also in the form of so-called University of the Third Age.

We are also active in transfer of knowledge to practice, primarily through licensing of

intellectual property, mainly in the form of software applications. These activities are a source of income for the faculty as well as new contacts with companies that result in long-term cooperation in applied research and development. In November 2019, the faculty concluded a golden partnership with ŠKODA AUTO. The idea is to connect IT theory and practice in order to enhance the effectiveness of the automotive industry and educate future IT experts.

Within CTU, the faculty participates in the prg.ai initiative established together with Charles University, the Czech Academy of Sciences and the City of Prague to support cutting-edge science and research in the field of artificial intelligence (AI).



FIT's person of the year 2019

Prof. MSc. Jan Vitek, PhD.

Thanks to Jan Vitek, professor at Northeastern University in Boston, who decided to implement a prestigious ERC grant worth EUR 3 million at FIT CTU, the faculty has a great space for research into programming languages. The ELE (Evolving Language Ecosystem) project explores the basic principles of the development of programming languages and creates tools to support their evolution.
Why did he choose FIT for his research? "FIT reminds me of the university in Boston, where I have been working the past 4 years. I see it as a faculty with a similar potential," says the renowned IT scientists who was born in the Czech Republic but emigrated with his parents at the age of two to Switzerland, where he studied computer science. He has written hundreds of science papers with over 1000 citations. He previously worked at Purdue University and Stanford University, and for companies IBM and Oracle. At the Faculty of Information Technology CTU he is head of the Programming Research Laboratory, which was created thanks to the EU project. The faculty has used the funds from the ELE project since 2016 and has achieved excellent results. As of the end of 2019, the results had been presented in over 30 science papers, mostly at prestigious, globally respected scientific conferences (ranked A* or A in the CORE Rankings). Two articles received the Distinguished Artifact Award. 2019 was important for Jan Vitek also on a personal level – the quality of his scientific research work was acknowledged by the FIT Scientific Council, which unanimously approved of appointing Dr. Vitek professor in Informatics, a decision which was later confirmed also by the CTU Scientific Council.

In April 2019, the Masaryk Institute of Advanced Studies commemorated one hundred years of teaching of economic disciplines by a great gig by the band Čechomor.
In 1919, almost exactly at the same time when independent Czechoslovakia was established, the long efforts of Czech economists that had started at the beginning of the 20th century came to fruition as the Business School (VŠO) was established first as a temporary constituent part of the Czech Technical University School, today's CTU. At the beginning, its founders thought it would become an independent institution, but it turned out that the whole education system of Czechoslovakia would benefit from VŠO as a "higher education institution with a focus on engineering with the aim to educate and edify students so that they are fit as scientists and as people to independently conduct research and creative activity in economic sciences and independently manage economic activity of companies and government bureaux" that would remain part of CTU.
The main initiator of economic disciplines at universities in the Czech lands in the 1900s was Prof. Albín Bráf, a renowned lawyer and economist, founder of the contemporary Czech economic terminology, who had taught at the Czech Technical University School since 1877, and whose legacy the institute honours until today. This is why the awards for the contribution to the development of economic disciplines at CTU that MIAS started to hand out in 2019 to commemorate the 100th anniversary of the establishment of economic education at CTU bear his name.
MIAS is different from most other university institutes of CTU in that it focuses on teaching economic and pedagogical disciplines in bachelor and master study programmes and that it has relatively high number of students in these programmes. In the autumn of 2017, MIAS submitted an application for accreditation of new bachelor and master study programmes in Czech and English versions Ekonomika a management / Economics and Management and Projektové řízení inovací / Innovation Project Management. The accreditations were awarded in May 2019, which opened a path to an even higher quality of education in economic disciplines. In 2019, the efforts culminated in the preparation of other accreditation files. At the same time, MIAS achieved a new level of results in internationalization and science.

MASARYK INSTITUTE OF ADVANCED STUDIES

Study programmes

In recent years, one of the major changes in teaching economic study programmes at MIAS has been a greater focus on mathematics, statistical methods and exact analytical methods. Despite the higher demands, the interest in the programmes has not decreased. The new trend of an increased interest to study in bachelor study programmes at MIAS on the part of high school graduates with excellent study results that could be witnessed in 2016 and which intensified in 2017 and 2018 has led to creating stricter criteria for admission without entrance examinations. Only such students could be admitted to study at MIAS without an entrance test in mathematics and English who achieved an average of 1.4 instead of 1.5 in their third year at high school. After complying with this condition or after passing the entrance examination, a total of 352 students registered for bachelor programmes and a total of 197 students registered for master programmes at MIAS in the 2019/2020 academic year. The interest to study economic disciplines at MIAS stemmed, among other things, from a very good employability of the graduates. MIAS has a rule that student theses in bachelor and master studies must be prepared at companies and explore specific issues that the given company is facing at the given time. A thorough personal knowledge of company practice allows students at MIAS to efficiently use the acquired theoretical knowledge right after completion of their studies. It is no exception when after graduation students start work at the same company where they had their internship.

In addition to a close link between the study and practice, it is also typical for MIAS that students are motivated to carry out own activities outside the scope of their studies. In May 2019, Czech and foreign students had a possibility to use the results of their activities at the 4th annual international scientific conference commemorating Albín Bráf, whose scientific committee was composed of representatives of CTU, Óbuda University Budapest, Jagellonian University Krakow and the University of Chemistry and Technology in Prague. A total of 27 authors participated in the preparation of 19 studies; all conference papers were peer-reviewed and published in conference proceedings.

In the course of 2019, MIAS strived to extend its range of accredited bachelor and master study programmes. As part of regular renewal of accreditations, MIAS submitted an accreditation file for a pedagogical study programme in Teaching of Practical Classes and Expert Training, whose guarantor is doc. PhDr. Jitka Lorenzová, Ph.D. Since the MIAS's profile creates perfect conditions for cooperation between several technical universities, a joint MIAS CTU and UCT team led by doc. Ing. Jan Vlachý, Ph.D. (MIAS) prepared a joint master study programme in Odvětvový management / Sectoral Management, the intent of which was approved by academic senates of both universities.

Internationalization

The involvement of international students in the programme of the conference commemorating Albín Bráf was just one in many activities undertaken by MIAS in the field of internationalization in 2019. In 2017, MIAS started to organize the MIAS International Summer School, which soon earned acclaim and in June 2019, MIAS welcomed 49 students from all over the world at its 3rd edition. The summer school does not only offer courses and show participants monuments in the Czech Republic, but the main focus is on team work of groups composed of students from all over the world. The division of attendants in international teams is important for the whole course of the summer school: its members together solve one task and they present the solution at the end of the summer school at a joint seminar. The play and the competitiveness introduce new elements to the instruction and support maintaining the established contacts in the future.

Over 130 international students studied in the accredited study programmes in the 2018/2019 academic year (and are also enrolled in the 2019/2020 academic year); some of them study just selected subjects. In addition, dozens of students from abroad interested in the study at MIAS attended one-year preparation courses. Over 20 Czech students in bachelor and master study programmes went to study abroad for one semester at partner universities based on bilateral agreements. In the same year, over 50 students went abroad on short-term project stays that are also organized in cooperation with partner universities.

Projects

In 2019, academic workers at MIAS published 7 papers in journals included in the Web of Science and Scopus databases, which covered all key disciplines taught at MIAS: economics, business management, management. The number of publications of this type had dropped slightly compared to previous year, but this was balanced by the quality of results. One paper was published in a journal that belongs in the 1st quartile in the Web of Science database, two other papers were published in a journal that is in the 2nd quartile in the Scopus database. Academic workers at MIAS also published papers in conference proceedings registered in the two databases.

The involvement of MIAS staff in TA ČR projects awarded in 2018 was also an important part of activities in 2019. Projects in economics included a project called Enhancing Quality of Systems and Processes of Approval of New Construction Projects in Prague: Accessibility of Housing, and a project called Models of Social Housing, Their Spatial and Technical Parameters developed in cooperation with the Faculty of Architecture. In the field of pedagogy, MIAS implemented a project called

Development of Digital Competences of Teachers of Social Sciences at Secondary Technical Schools, which turned out to be of great importance in connection with the global pandemic at the start of 2020. In 2019, academic staff at the Department of Pedagogical and Psychological Studies implemented an interdisciplinary project on Integration of Children from Children Homes in Society and Their Adaptation on the Labour Market. By being involved in the project Neurotechnology to Increase Quality of Life and Prevention of Cyberbullying in Society 4.0, MIAS also participated in contractual research.

The Klokner Institute is an independent workplace within CTU in Prague. It was established in 1921 by Professor František Klokner as the first scientific research workplace of its kind in Central Europe. The foundation of the institute was precipitated by the construction boom after World War I. From the very beginning, the institute contributed to enhancing the technological quality of buildings, implementation of new types of building materials and technologies and stood at the beginning of modern construction and building testing.

The Klokner Institute was involved in the process of building of many important structures – fortresses before World War II, concrete dams of the Vltava cascade, the Prague metro, Nuselský and Barrandovský bridges, and the nuclear power plant in Temelín. It has gradually become a multidisciplinary workplace. Currently, it carries out research tasks in the field of civil engineering, power engineering, mechanical engineering and chemical engineering. It has four specialized departments (the Department of Structural Reliability, the Department of Building Materials, the Department of Mechanics and the Department of Experimental Methods) and an accredited laboratory; it is also a standardization centre and carries out expert activities. It has over 80 employees.

In 2019, the institute implemented a number of grant projects supported by the Technology Agency of the Czech Republic, the Grant Agency of the Czech Republic, the Ministry of Industry and Trade of the Czech Republic, the Ministry of Culture of the Czech Republic and the Ministry of Transport of the Czech Republic. It participated in teaching of postgraduate students and education of the members of the professional community in the form of conferences. It was involved in the assessment of lifespan of bridge structures of famous structures such as the Negrelli Viaduct, the Libeňský Bridge and the Hlávkův Bridge. Employees at the institute prepared national (CSN) and international standards (CEN and ISO). In 2019, they received a number of prestigious awards, including the Czech Architecture Award.

Doc. Ing. Jiří Kolísko, Ph.D.
Head of the Klokner Institute, CTU

KLOKNER INSTITUTE

Study programmes

The Klokner Institute (as a university institute within CTU) organizes doctoral studies in two fields of study: Theory of Non-metal and Building Materials, and Theory of Structures. The aim of the study is to acquaint students with the latest knowledge in theory of building materials and structural reliability theory, including experimental and theoretical methods. The study comprises a comprehensive scientific preparation based on which students will acquire deep knowledge in their specialization. Doctoral students (there were 25 of them at the institute in 2019) are involved in scientific research tasks and expert activities in the framework of Klokner Institute's close cooperation with universities abroad, research institutions and construction practice. Graduates have theoretical knowledge and language skills that allow them to comply with demanding requirements of research in the field of development of new building materials and technology of their production, structural reliability theory, experimental verification of properties and behaviour of structures, assessment and diagnostics of existing structures, including historic structures.

Projects

Scientific and research activities of the institute's staff are financed partly from grant projects and operational programmes. In 2019, six scientific projects were launched – two were financed by the Technology Agency of the Czech Republic (TREND Programme and the New Centre of Competence – National Centre of Power Engineering), two were standard projects of the Grant Agency of the Czech Republic, one was financed by the Ministry of Culture (NAKI II) and one by the Ministry of Transport (DOPRAVA 2020+). At the same time, 30 other existing projects of various Czech providers were solved. In 2019, 11 of them were successfully completed.

International cooperation

In 2019, employees at the institute participated in international research in materials engineering and structural reliability (RILEM, IABSE, fib, WTA, JCSS). They worked as members of editorial boards in prestigious international journals (International Journal of Heritage Architecture, International Journal of Safety and Security Engineering, Structural Concrete – the official journal of the fib, International Journal of Structural Glass and Advanced Materials Research) and in committees of international conferences (ESREL, STREMAH, RILEM, SAFE). They participated in international projects COST and collaborated with prestigious research institutions (Politecnico di Torino, Torroja Institute, Madrid, TNO Delft, TU Ghent, Universidade de Coimbra – Pólo II, University of Stellenbosch, JAR, JRC Ispra) and leading partners from industry (LafargeHolcim Research & Development, France).

Awards

In 2019, our staff participated in two major architectural projects for which they received awards. The first one was the Footbridge across the Dřetovický Brook in Vrapice near Kladno. Ing. MgA. Ing. arch. Petr Tej, Ph.D., received the Czech Architecture Award 2019 presented as part of the Czech Architects Grand Prix for this modern sculpture. Dr. Tej also received an honourable mention for a footbridge across the Lubina River in Příbor, together with his collaborators Ing. arch. Marek Blank and Ing. Jan Mourek. As part of the annual international symposium WTA, two promising young scientists received awards: Ing. Milan Rydval, Ph.D., won first place in the competition for best dissertation thesis in the field of Rehabilitation and Renovation of Buildings 2019. Ing. Šárka Nenadálová, Ph.D., received an honourable mention for her dissertation thesis. Ing. Tomáš Bittner, Ph.D., won second place with his outstanding dissertation thesis on concrete in a competition organized by the Czech Concrete Society.

Other important actions and events

In 2019, the Klokner Institute organized two symposia – the 41st Conference on Rehabilitation and Renovation of Buildings and the concurrent 21st International Conference on Rehabilitation and Renovation of Buildings CRRB. Papers presented by the participants were published in the conference proceedings included in the SCOPUS database. Further, the institute was actively involved in the organization of the international Forum of Young Researchers in Sustainable Building YRSB19 intended mainly for junior scientists and doctoral students.

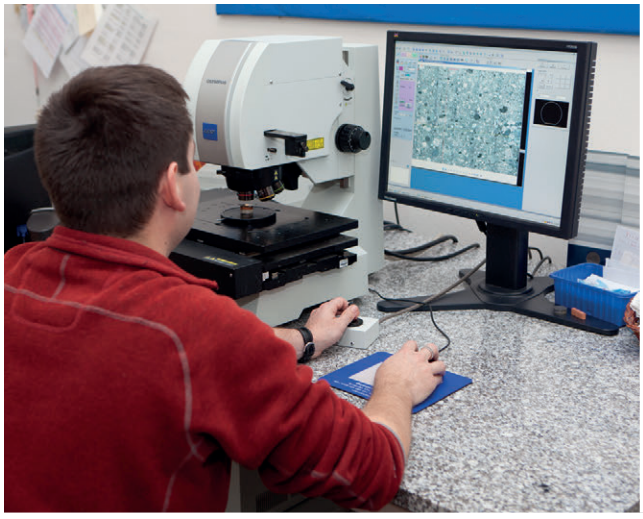
Third role of the institute

In 2019, the employees at the Klokner Institute dedicated to scientific as well as expert, innovation, teaching and standardization activities and worked as experts appointed by courts. A number of outcomes of the work of our scientists is used in daily life and by the commercial sector. The transfer of outcomes of scientific activities to practice (technology transfer) is one of the key activities undertaken by the institute. In 2019, its employees collaborated with a range of renowned industry partners (ČEZ, a.s., Českomoravský beton, a.s., KŠ Prefa, s.r.o., Koltex, s.r.o, Pontex, s.r.o., Novák Partner, s.r.o., Metrostav, a.s., Skanska, a.s., and more) and estabslihed collaboration with a number of state agencies. Collaboration with both private sector and the state administration was carried out in the form of solution of grants as well as public tenders. Examples of this collaboration included the Road and Motorway Directorate of the Czech Republic, Správa železnic and the Technical Road Administration of the City of Prague on analyses of lifespan of bridge structures (the Negrelli Viaduct, the Libeňský Bridge, the Hlávkův Bridge and more). Also of importance was the collaboration with the University of Defence in Brno. The outcomes of the collaboration were used in the preparation of regulations in the field of national security – Operational Preparation of National Territory (implemented 2018–2019). These

activities are a proof of Klokner Institute's reach outside of the region.

Another important field in which the Klokner Institute achieved a lot in 2019 was innovation activity. The indicator of success is the number of utility models, patents and registered designs: in 2019, the Klokner Institute received protection for three outcomes of its scientific activities in the form if utility models. They were developed in cooperation with Českomoravský beton, a.s. What the outcomes had in common is the progressive solution of concrete components in aggressive environment. In total, the Klokner Institute is the holder of 25 official decisions on the protection of intellectual property rights, of which 14 were patents and 11 were utility models (as of the end of 2019).

The Klokner Institute also participated in the preparation of Czech National Standards. Its employees were also involved in standardization activities in the framework of the European Committee for Standardization (CEN) and the International Organization for Standardization (ISO).




VÝZKUMNÝ A ZKUŠEBNÍ ÚSTAV

In 2019, the period of building the institute and putting it on the map of the academic and industrial sectors in the Czech Republic and in Europe has come to an end. In the years 2013-2019, we succeeded in creating an institution that is an important centre of artificial intelligence (AI) and Industry 4.0. The year 2019 was a very good year for the institute as it succeeded to increase the size of its scientific team to a critical size needed for strategic international collaboration, develop it and successfully establish international partnerships with top research institutes. CIIRC became financially independent.

We are glad that the unusual leadership structure (in the Czech Republic) with director – scientific director is a functional one for the development of the institute's excellence.

We have secured sustainable funding for at least the next 6 years, we are building RICAIP, a European centre with a potential to push the boundaries of the current understanding of automated industrial production towards flexible, distributed and cooperative production. We are able to connect experimental testbeds for Industry 4.0 in Prague, Brno and Saabrücken, and soon there will be more, also outside Europe. Also thanks to this we are an important integrator of activities in the Czech Republic.

The world keeps changing and science plays an important role in it as it prepares technologies for the future society. We are and wish to be a part of wider social changes and that's why not only international but also interdisciplinary cooperation is very important for us.

Mgr. Ondřej Velek, Ph.D., Director
Prof. Ing. Vladimír Mařík, DrSc., dr. h. c.
Scientific Director of the Czech Institute
of Informatics, Robotics
and Cybernetics, CTU

CZECH INSTITUTE OF INFORMATICS, ROBOTICS AND CYBERNETICS

Education of PhD students

In the past, 36 CIIRC employees were involved in education of doctoral students and they supervised 91 students in Ph.D. programmes at 12 faculties and universities in the Czech Republic and abroad. 38 of our teachers are involved in the educational process at different faculties. CIIRC currently has no own doctoral study programmes.

Projects

After more than 2 years of intense preparations, RICAIP – the Research and Innovation Centre on Advanced Industrial Production - was launched in September 2019. In the next more than 6 years, partners in the RICAIP project will be able to use funds from European and Czech sources in a record amount in the Czech Republic – nearly EUR 50 million (CZK 1.2bn). In this way, the biggest European centre of excellence for advanced industrial production in the field of artificial intelligence and industrial robotics will be created that will rely on strategic cooperation between the Czech Republic and Germany. The project's partners are CIIRC CTU, its main coordinator, CEITEC VUT, and DFKI and ZeMA in Saarbrücken. The newly constructed centre RICAIP has a truly European format and will serve research in the field of AI throughout Europe. Naturally, a big part of the capacity will boost modernization of Czech SMEs. It should also be noted that RICAIP will contribute to the modern education of students and doctoral students at CTU and VUT.

In 2019, we also launched the following Horizon 2020 projects: DISTINCT, ARtwin, THERMAC, DeepSpA and Arrowhead tools.

International cooperation

For CIIRC, Industry 4.0 and artificial intelligence are major topics: in the past, CIIRC joined a number of Czech and European initiatives and platforms, including CLAIRE (Confederation of Laboratories for Artificial Intelligence in Europe) in March 2019 and ELLIS (European Laboratory for Learning and Intelligent Systems) in December 2019. Both platforms also have their Czech offices at CIIRC CTU, which were established thanks to renowned scientists at CIIRC Josef Šivic, Josef Urban, Robert Babuška and Tomáš Pajdla and the experience Dr. Vít Dočkal has with projects. The institute has a long cooperation with INRIA in Paris (and the PRAIRIE initiative) and with one of the best AI centres in the world – DFKI in Germany. CIIRC CTU is also the only European digital hub for artificial intelligence (DIH AI) in the Czech Republic and it collaborates with 29 partners across Europe on transfer of knowledge primarily towards SMEs.

Awards

In 2019, scientific workers at CIIRC received a number of prestigious international awards at conferences, including, among others:

- Hugo Cisneros, Josef Šivic and Tomáš Mikolov. Evolving Structures in Complex Systems (SSCI) 2019. Best Student Paper.
- Marek Vlk, Antonín Novák and Zdeněk Hanzálek. Makespan Minimization with Sequence-Dependent Non-Overlapping Setups. ICORES 2019. Best Student Paper Award.
- T. Duff, K. Kohn, A. Leykin, T. Pajdla. PLMP – Point-Line Minimal Problems in Complete Multi-View Visibility. ICCV 2019. Best Student Paper Award.
- Jiří Vlasák, Michal Sojka and Zdeněk Hanzálek. Accelerated RRT* and its Evaluation on Autonomous Parking. VEHITS 2019. Best Industrial Paper Award.
- Vladimír Kučera. Albín Bráf's Medal 2019.

A team of CTU students led by Prof. Zdeněk Hanzálek at CIIRC won third place in the Formula F1/10 Autonomous Formula Competition at Columbia University in New York, the USA. The student team, which uses the knowledge it gains for further cooperation with car manufacturers placed well in this competition series also in previous years.

Dr. Jan Šedivý's team once again proved itself in the Amazon ALEXA competition and came second.

In December 2019, the CTU Scientific Council approved of the award of a doctor honoris causa degree to Professor Wolfgang Wahlster, a long-term CIIRC collaborator, promoter of Czech science abroad and spiritual father of Industry 4.0. The ceremony took place at the Bethlehem Chapel in January 2020.

Distinguished guests

In 2019, we welcomed distinguished guests at our laboratories and departments at meetings that were either strategic or scientific. The visitors included Manfred Weber, chair of the EPP Group of the European Parliament; Judith Gerlach, Bavarian minister of state for digital affairs; Roysei Tanaka, State Minister from the Cabinet Office of Japanese Government, representatives of the US government agency National Science Foundation, to name just a few. Also the meeting with Bernhard Maier, CEO of Škoda Auto, was very important.

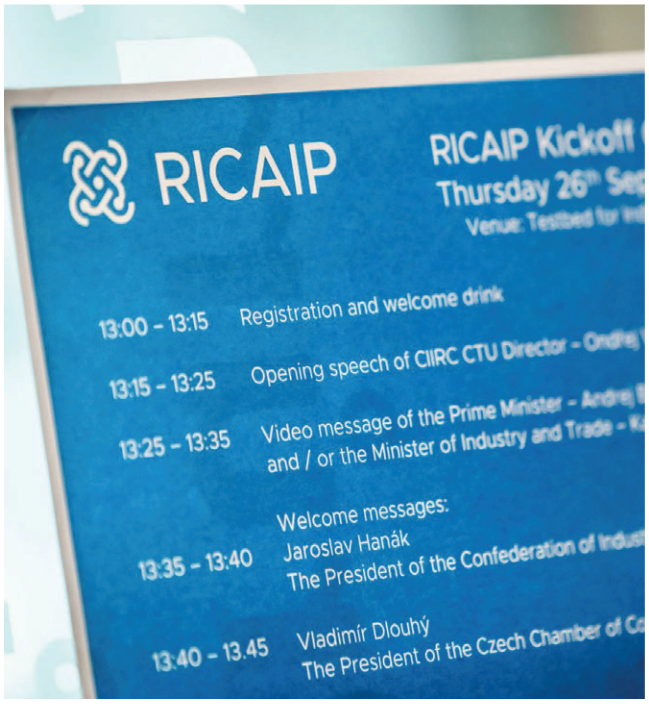
Lecturers at CIIRC CTU included Růžena Bajcsy, a renowned roboticist born in Czechoslovakia, now at University of California, Berkley, Geoff Suttcliffe from the University in Miami and Jacob Biamonte from Skoltech (Skolkovo Institute of Science and Technology) in Moscow.

Important actions and events

In 2019, the Czech Institute of Informatics, Robotics and Cybernetics hosted and organized a number of conferences and events for the public.

The 9th year of the European Conference on Mobile Robots ECMR took place in September in Prague. It welcomed more than 100 top researchers from Europe, the USA and Asia. ECMR is an international open biennial intended primarily for young scientists in the field of basic and applied research that serves as a forum for discussions about the latest results and innovation in research and the use


olic Establishment of the
P Centre of Excellence
RICAIP


RICAIP
RICAIP Kickoff
13:00 – 13:15 Registration and welcome drink
13:15 – 13:25 Opening speech of CIIRC CTU Director
13:25 – 13:35 Video message of the Prime Minister
and / or the Minister of Industry and Trade
13:35 – 13:40 Welcome messages:
Jaroslav Hanák
The President of the Confederation of Indus
13:40 – 13.45 Vladimír Dlouhý
The President of the Czech Chamber of

of artificial intelligence in mobile and autonomous robotics.

The Urban Resilience conference, jointly organized by CIIRC CTU and EFEED that took place in October focused on an important, yet relatively new topic of urban resilience in the time of artificial intelligence. Urban resilience integrates findings of various scientific disciplines with the aim to prepare cities for how to deal with risks connected with events like earthquakes, flooding, blackouts or pollution.

The Centre of the City of the Future organized the 1st edition of the international conference Future City Made by IoT in April.

CIIRC joined as a partner in the visionary conference Symposium Next100 focused on interdisciplinary cooperation with the aim to help fulfil its mission: to create a space for interdisciplinary dialogue about how we can positively shape the society of the future using new technologies.

Third role of the institute

Transfer of knowledge between the academic and industrial sectors is very important for CIIRC CTU. It is mainly undertaken at so-called centres – i.e. the National Centre for Industry 4.0, the Centre of the City of the Future, the RICAIP Centre and the key infrastructure of the Testbed for Industry 4.0. They create an ecosystem of collaboration between academic and industrial sectors and implement specific research projects. It is also the seat of joint laboratories, for instance with Škoda Auto, Eaton or Rockwell Automation. They are used as incubators for successful student start-ups using CIIRC own e-club accelerator. An example of these activities is AlquistAI, who received several awards for its chatbot, including at the prestigious Amazon Alexa Prizes.

An important part of CIIRC's mission is being active in educating the public and the local community. We regularly take part in events like the Night of the Scientists and Different City Experience. The general public, high school, primary school and vocational school students and the professional community can learn more and establish cooperation in Industry 4.0 during Open Doors Days organised by the National Centre for Industry 4.0, which builds an ecosystem of cooperation between the academic and industrial sectors in the field of digital technology.

Our aim is to support energy efficient buildings that are also environmentally friendly and offer healthy and comfortable internal environment for its users. S.A.W.E.R., equipment for extraction of water from air in deserts, gained most attention in 2019. Its first prototype underwent a 6-month trial operation near Sweihan, the UAE. At the end of the year, we completed a second version of the S.A.W.E.R. system, which will be installed at the Czech national pavilion at EXPO 2020. Building on this research, we started to develop autonomous mobile equipment MAGDA in March 2019, which can be installed on any van and can be used as an emergency source of water extracted from air humidity with a daily production of about 10 litres.
In addition, we made progress in other areas of research, development and innovation. In cooperation with Damgaard, we launched the micro power plant WAVE 50 to the market. Its first commercial installation is used as source of electricity and heat for the municipal office, shop and fire station in Mikolajice near Opava. At the end of 2019, an emission test for pollutants from burning of woodchips proved that the automatic boiler complies with the EU norms with a wide margin.
IoTs that we regularly use in practice represent a leap forward in conservation of energy, increasing the standards of living and care for the environment. In addition, we continue in the development of new materials. Thanks to that, we were able to develop and present to the public Levitee, a designer set of concrete urban furniture with the option of installing smart technologies.

Doc. Ing. Lukáš Ferkl, Ph.D.
Director of the University Centre
for Energy Efficient Buildings, CTU

UNIVERSITY CENTRE FOR ENERGY EFFICIENT BUILDINGS

Projects

In 2019, we started work on several international projects under the prestigious programmes Horizon 2020 and Interreg. More specifically, under the project SPARCS, we began to help Kladno on the way to achieve carbon neutrality, in the framework of which an energy self-sufficient quarter will be built in the city. With the help of the University Centre and other European cities that joined the project, Kladno will create an own vision in the next five years that is tailored to local needs. One of its specifics will be the economic and efficient use of a large underground water reservoir for heat generation management.

We manage the National Centre of Competence CAMEB, the aim of which is to find a solution for the future shortage of non-renewable resources and its impact on the building industry. Therefore, together with our partners we are working on an efficient use of materials using the lifecycle methodology and extending the knowledge about circular economy.

The aim of the international project POWERSKIN+ is to develop a completely innovative solution for facades of non-residential buildings using the latest technology. The result is the first generation of prefabricated modular and easily assembled components that get energy from the Sun supplemented with a high-capacity system for energy storage that will be piloted on the façade of our headquarters in Buštěhrad.

We are involved in the Next Generation District project, under which a software tool for optimal design of the size of components and economy of energy systems was completed in December 2019. Currently, work is underway on predictive regulation for local distribution systems. The project's main objective is the development and piloting of an innovative energy system in residential housing using advanced control theory and numeric optimization. This is in response to the direction the power engineering has taken to a maximum use of local renewable energy sources within individual buildings.

International cooperation

For several years now we have been cooperating with Germany on a concept of energy positive buildings. We have also completed an international project MORE-CONNECT under the Horizon 2020 programme focused on modular renovation of residential buildings. The implementation of these projects on specific examples will show that it is possible to build high-quality, energy efficient buildings in our country that are healthy and comfortable for residents and at the same time environmentally friendly.

Awards

In cooperation with the Czech Green Building Council, we have come up with a methodology for the assessment of sustainable smart cities that should help local administrations plan, using evidence-based planning. This preparation was supported by the Ministry for Regional Development of the Czech Republic.

Our headquarters in Buštěhrad was ranked among top 10 groundbreaking energy economic buildings built in the Czech Republic between 2009 and 2019. The selection was made by the Czech Green Building Council.

In September 2019, Professor Jan Tywoniak received the Outstanding Contribution Award for his paper on Building Physics as a Tool for Development of New Components: Roof Window at the international conference Sustainable Built Environment D-A-CH at Graz University of Technology, Austria. At the conference Technologies and Materials for Renewable Energy, Environment and Sustainability held in Athens in September, Václav Novotný received the Best Paper Award for his paper on Intermediate Pressure Reboiling in Geothermal Flash Plant for Increased Power Production and More Effective Non-Condensable Gas Abatement.

We have so far received patent protection for our heat system Hydronics 4.0, which will reduce investment costs and the use of energy in administrative buildings, in the Czech Republic, on the whole area of the European Union and the USA. Currently, we are applying in Canada.

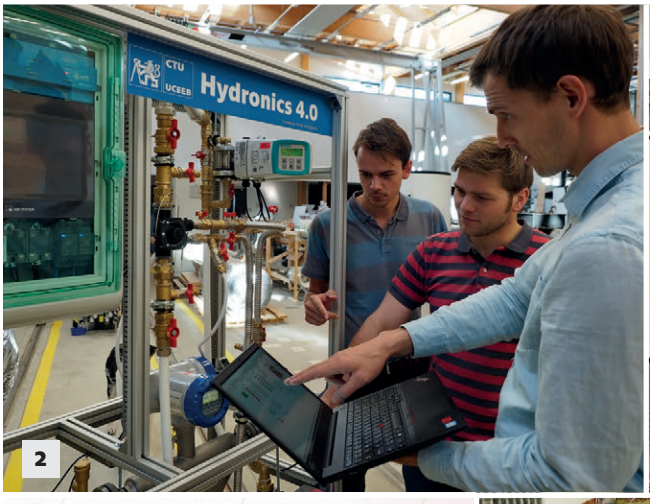
In November 2019, UCEEB director Lukáš Ferkl was elected to the board of the Czech Green Building Council, whose activities aim at the fulfilment of the so-called Zero version, i.e. the state when buildings will have zero impact on the environment throughout their lifespan.

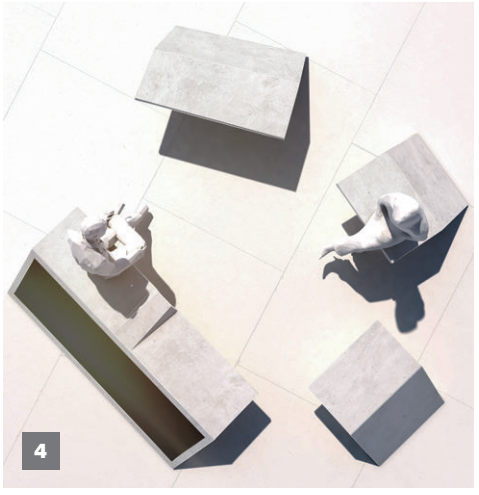
Other important actions and events

In June 2019, a scientific council composed of renowned experts from foreign universities and research institutes, representatives of the Czech government and industry met at our headquarters in Buštěhrad. The aim of the visit was an independent evaluation of UCEEB's work so far and a discussion about its further development and possibilities for future international cooperation. We were highly praised for what we had achieved in the five years of our existence and how we had established ourselves on the local market.

Third role of the institute

We are predominantly focused on cooperation with practice; 95% of the centre's turnover is generated by joint projects with industrial partners, of which 20% is contractual collaboration (which is a maximum in accordance with legal regulations), which is represented by over 100 individual contracts with over 70 partners. About 20 different products are now available on the market that were developed in cooperation with the University Centre for Energy Efficient Buildings in 2019.





<1> UCEEB building; <2> Hydronics ; <3> Micro power plant WAVE; <4> <5> Levitee project

UCEEB's person of the year 2019

Doc. Ing. Tomáš Matuška, Ph.D.

Doc. Ing. Tomáš Matuška, Ph.D., head of research department Energy Systems in Buildings, is a leading personality at the centre. His long-term focus is on research and development of equipment for solar systems, heat pumps and advanced systems with a high proportion of renewable energy resources. He is also active outside of CTU. He is chair of the Czech Solar Energy Society, he is a regular organizer of the Alternative Energy Sources conference in Kroměříž and gives lectures for the public as part of various specialized courses and seminars. In the past few years, he has put most of his efforts into the S.A.W.E.R. project that has received a lot of positive feedback both at home and abroad. As head of project he has participated not only in the research and development phase, but also in the system's successful installation and monitoring in the desert in the United Arab Emirates in 2019. Also the assessment stage of the energy system developed in the framework of a TA ČR project called Sustainable Energy Development for Nearly-Zero Buildings in which he was main investigator was successfully completed in 2019. After two years of monitoring of the equipment that efficiently uses a combination of heat pump, photovoltaics and thermal heat storage, results predicted by computer simulations were confirmed. A building equipped with the experimental system consumes just 25% of energy compared to a passive building.

The Institute of Experimental and Applied Physics serves as an experimental base at CTU for research in the field of particle and nuclear physics. Following fundamental experiments we develop modern detecting technologies (primarily semi-conductor pixel and strip detectors, scintillation detectors) and their application in imaging of inanimate and animate nature (X-ray radiography and tomography in high resolution at a micron level), measuring mixed radiation fields and in satellite experiments (detection of cosmic radiation, sensors for x-ray telescope).
The institute's achievements include the construction of a module to measure cosmic radiation on the RISESAT satellite, which was launched to space by the Japanese Aerospace Exploration Agency in January 2019. In connection with the involvement in experiments in the underground laboratories LSM in France and SNOLAB in Canada, technologies are being developed at the institute that are used for low-background experiments focused on neutrino physics and in the search for the dark matter in space. Following fundamental experiments in particle and neutrino physics, the relevant theoretical physical disciplines are developed at IEAP. In 2019, the institute moved from Albertov to the new premises in the Bethlehem Palace on Husova Street.

Doc. Ing. Ivan Štekl, CSc.
Director of the Institute of Experimental
and Applied Physics, CTU

INSTITUTE OF EXPERIMENTAL AND APPLIED PHYSICS

Study programmes

Although the Institute of Experimental and Applied Physics (IEAP) has no own accredited study programme, it is active in education. In 2019, it focused on supervising theses of students from other CTU faculties, other universities in the Czech Republic (Charles University, University of West Bohemia in Plzeň, Silesian University in Opava) and abroad (Erlangen, Montreal). Four students working at IEAP presented and defended their dissertation theses in 2019. IEAP also serves as a training workplace for six foreign students sent to CTU through IAESTE. In cooperation with the Joint Institute of Nuclear Research in Dubna (JINR, RF), the institute organized the annual summer practice for university students on the premises of the Joint Institute of Nuclear Research in Russia. In 2019, the event was attended also by 6 high school teachers and 17 students – winners of the national round of the Olympics in Physics in category A. Two members of IEAP staff worked as lecturers at the IEEE NPSS International School for Real Time Systems 2019 in Kuala Lumpur. A training session for teachers under the title Progressive Detection Methods in Teaching Subatomic and Particle Physics was held at IEAP as part of lifelong learning and focused on the use of semi-conductor pixel detectors of ionizing radiation in classes. The institute is accredited to organize these courses by the Ministry of Education, Youth and Sports. 63 participants attended the popular lectures on the Secrets of the Microcosm and Laws of the Microcosm as part of the University of the Third Age.

Projects

The biggest project that has been solved at IEAP for 3 years now is called Engineering Applications of Microworld Physics supported in the framework of the OP RDE programme Excellent Research (CZK 200 million in total). The project covers most research activities undertaken at IEAP and is solved in cooperation with many co-investigators at Czech universities and institutes (CTU: IEAP, FBME, FTS, CIIRC; 3rd Faculty of Medicine, Charles University; the Faculty of Electrical Engineering, the University of West Bohemia; the National Radiation Protection Institute; the Institute of Theoretical and Applied Mechanics CAS). One of the most successful areas of IEAP activities is the application of detection technologies in space. In 2019, the MIRAM (Miniaturised Radiation Monitor) project sponsored by ESA was in its second year. It aims to design, develop and test prototypes of miniature radiation monitors for telecommunication satellites. Also the newly accepted H2020 project called Penetrating Particle Analyser (PAN) has to do with space technologies. Its aim is to develop a unique particle detector for space missions. The project's partners include also the University of Geneva (Switzerland) and Istituto Nazionale Di Fisica Nucleare (Italy).

International Cooperation

Almost all scientific activities at the institute were carried out in the framework of broad international cooperation with foreign universities and institutes. In the field of fundamental experiments in (astro)particle and neutrino physics these included international research institutes CERN (Switzerland), JINR (RF) and underground laboratories LSM (France) and SNOLAB (Canada). The development and application of semi-conductor pixel detectors were carried out in the framework of international collaboration Medipix (CERN), activities focused on satellites and space missions were undertaken in collaboration with the European Space Agency (ESA) and the Japanese Aerospace Exploration Agency (JAXA).

Awards

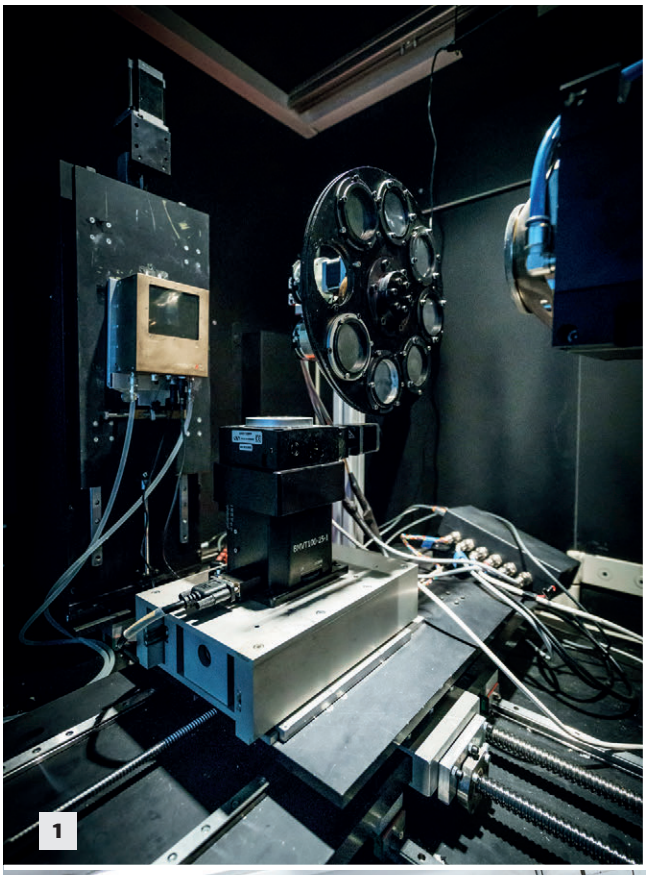
In 2019, Mgr. Miroslav Macko, Ph.D., employee of IEAP, received the Award of the Dean of the Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava, for the best doctoral dissertation in physics. He wrote his dissertation under the supervision of doc. Ing. Ivan Štekl, CSc., (IEAP) and Dr. Fabrice Piquemal (Université de Bordeaux).

One of IEAP employees, RNDr. Vladimír Vícha, was also among the people awarded at the annual awards handed out by the City of Pardubice. He received a medal for his lifelong contribution to physics education as a physics teacher at Gymnázium Dašická in Pardubice.

Other important actions and events

In 2019, IEAP organized important conferences and meetings:

- The First International Meeting of the Baikal-GVD Collaboration on Data Analysis and Project Modelling. The meeting of people involved in the Baikal-GVD project was held on 21–26 October in the new IEAP building. The aim of the project is detection of high-energy neutrinos that travel to Earth using the great volume of water in Lake Baikal.
- The 11th MoEdal Collaboration Meeting, an international meeting of researchers involved in the MoEDAL experiment at the LHC accelerator in CERN, was held on 5–7 June on the premises of the Czech Academy of Sciences on Národní Street. The aim of the experiment is to detect hypothetically extremely ionizing particles, such as magnetic monopoles.
- MEDEX'19 international conference on neutrino physics and dark matter was held on 27–31 May in the National Library of Technology.
- The Pontecorvo Neutrino Summer School in Sinaia, Romania, organized in cooperation with JINR Dubna, Comenius University in Bratislava, Charles University and CIFRA Romania was held on 1–10 September and was attended by 78 students and 22 lecturers from around the world.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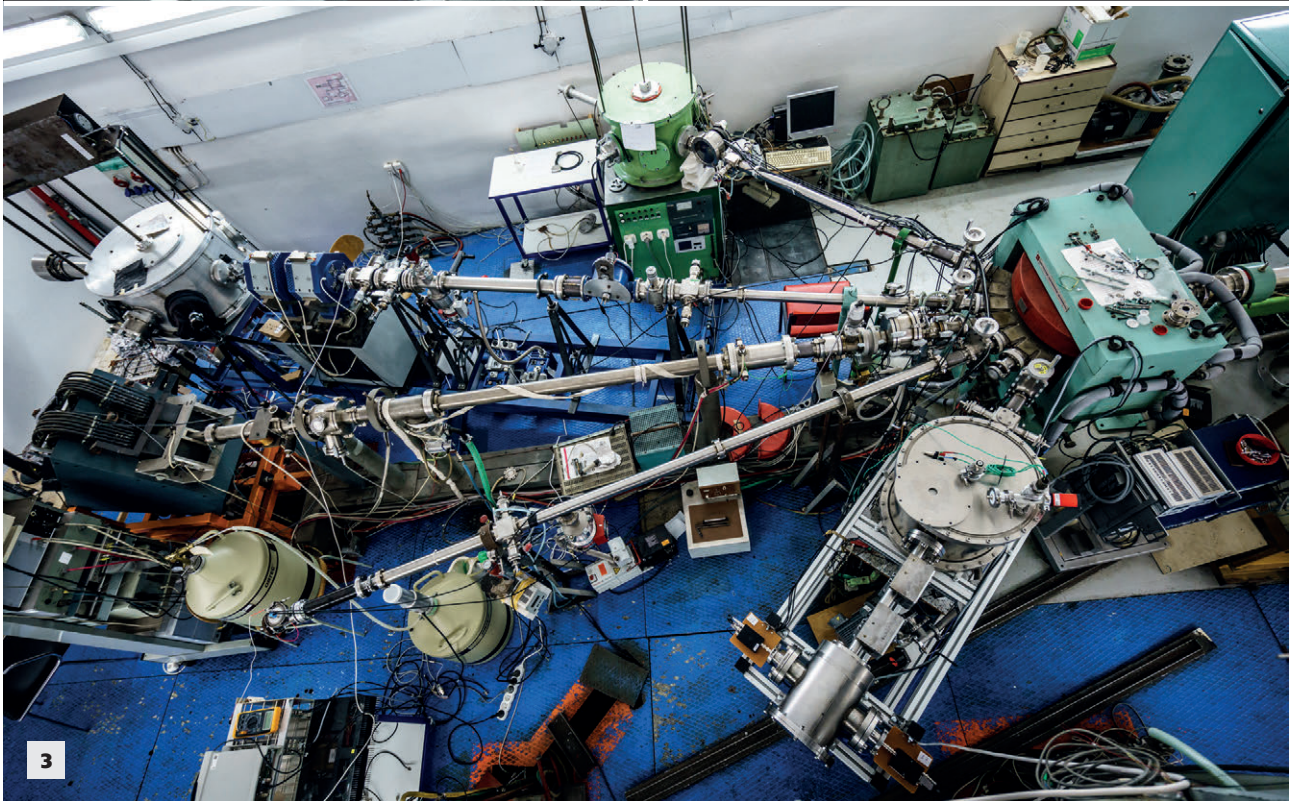
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> The COBRA Collaboration meeting of people involved in the COBRA experiment, which aims to detect neutrinoless double beta decay (24–25 September). These rare transformations of atom nuclei belong among the slowest processes in nature the half-life of which is greater than the age of space by many magnitudes.

In 2019, a US patent was granted for the Detector of Ionizing Radiation Enabling a Coherent Digital Image in the field of construction of large-scale semiconductor pixel detectors.

Third role of the institute

IEAP cooperates with a number of private companies in the development of modern detector and low-background technologies. Examples include NUVIA a.s., CRYTUR, spol. s r. o., and TEMA, spol. s r. o., with whom we successfully completed the project of the Centre of Competence – Radiation and Nuclear Safety Technologies Development Centre: RANUS – TD in 2019.

Unique low-background technologies for underground experiments have been developed at the institute in cooperation with the private sector for many years. Examples include technologies for extremely efficient removal of radon and other gases from the air (it resulted in contracts from company ATEKO for a number of laboratories worth over Euro 5 million). Spin-off Advacam s.r.o. was established a few years ago for commercial application of detector technologies developed at IEAP. The foundation of the spin-off, which is particularly successful abroad, means IEAP can carry out the desired transfer of technologies from basic research to practice. This is not only beneficial for society, but it also generates income for IEAP in the form of licence fees for know-how provided under contracts. The project MIRAM is an example of a successful outcome of collaboration between IEAP and Advacam in 2019.

<1> A high-resolution X-ray radiography and tomography device
<2> A tomographic section of a new-born mouse
<3> Van de Graaff accelerator laboratory

Physical education and sport have always been an important part of university life. However, its nature has changed in the last 20 years. In addition to the original focus on physical fitness and performance, the experience of performing physical and sports activities and their importance for the development of a healthy lifestyle of university students have played an ever-increasing role. This has significantly affected the content and scope of education and the used forms. The development of physical competences and knowledge in the field of kinanthropology and other related scientific disciplines is a source of sports and aesthetic experience and a compensation of sedentary way of life, a relaxation and recreation. People often continue doing the activities they did during their life at university also in their future professional life. Sports and physical activities at CTU are provided by the Institute of Physical Education and Sport. It organizes all forms of physical education at faculties and institutes as well as winter and summer sports courses. In 2019, the institute offered 48 sport specializations as part of regular instruction attended by 7,604 students. The range of sports is regularly adapted according to students' interests and new sports are added – in the last year, we added a bootcamp and BOSU workout.

Building of new and renovation of old sports facilities at CTU is very important for the development and better-quality sports activities at CTU. In 2019, the five-a-side football field in Strahov was renovated, a new surface was laid in small gyms Pod Juliskou and a new outdoor workout gym was built at the docks in Chuchle.

Doc. PaedDr. Jiří Drnek, CSc.
Director of the Institute
of Physical Education
and Sport, CTU

INSTITUTE OF PHYSICAL EDUCATION AND SPORT

PE videos

In order to improve the quality of education and meet the individual needs of students and staff, programmes of individual sports are available on our website. In 2019, more swimming, tennis and self-defence videos were added in the framework of Institutional Plan projects.

Courses on offer

In 2019, 10 winter skiing and snowboarding courses and specialized courses for Medical Rescuers were organized and were attended by 323 students. Courses held abroad (Austria, France, Slovakia) have particular appeal to students.

In the summer, the institute organized 37 courses attended by 909 students. The offer is very wide and annually updated based on students' interest. In 2019, the offer included courses in archery, self-defence, yoga, water tourism, windsurfing, volleyball, beach volleyball, cycling (road and mountain bikes), horse riding, golf, tennis, hiking, etc.

In the last years, orientation courses organized in cooperation with faculties have been gaining popularity. Students have the possibility to do sports and learn about the offer of sports and physical activities at CTU and acquire information from management of faculties and older students that they need for a successful start of studies at CTU.

"Amateur" sport

Physical education is supplemented with a wide offer of one-off sports events, such as the Rector's Sports Day at CTU attended by 792 students and employees; in total, over 2000 students attended sports activities outside regular courses in 2019. The activities of university sports unions VSK ČVUT and VŠTJ Technika Praha significantly enhance the offer of sports courses at CTU. Sports unions offer a wide range of sports and physical leisure time activities in their clubs and cooperate with the institute in organization of big sports events, such as the 17th November Run. Every year, one-semester courses for seniors are organized as part of the University of the Third Age for groups of 30 people.

Representation

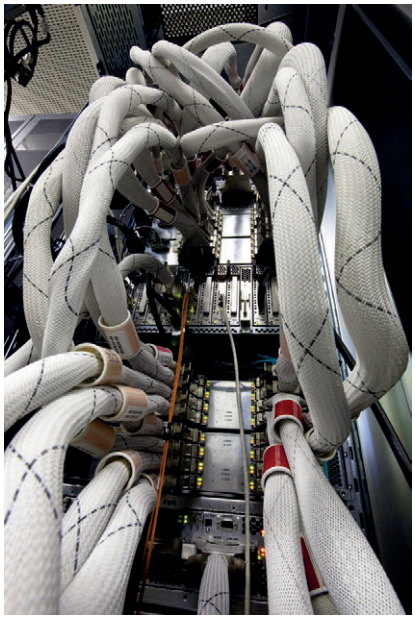
The institute in cooperation with faculties ensures representation of CTU at university competitions in the Czech Republic and at sport events abroad. In 2019, CTU students did well not only in the Czech Republic but also abroad. At home, the biggest achievements included victory in the university championship of the Czech Republic in indoor athletics and the successful participation of our athletes in the Czech Academic Games held in Brno in June. CTU came sixth in the competition of universities and won 31 medals, of which 7 were gold medals.

The sport achievements in 2019 culminated in November at the 5th World InterUniversities Championships in Pula, Croatia, where CTU won third place among 62 universities from 22 countries and 3 continents. In terms of individual sports, our football team won gold medals, our basketball men's team won silver medals and basketball women's team, volleyball men's team and badminton mixed doubles won bronze medals.

Regularly awarded extraordinary scholarships for successful representation of CTU in sport are a proof of how CTU values its talented students-athletes. The scholarships are awarded by deans based on a proposal from faculties. The highlight of the year is then the annual best athlete competition at CTU organized under the auspices of the Rector. In 2019, the award was given to Martina Satková, who represents the Czech Republic in water slalom and white water racing and who has won 17 medals at World Championships and European Championships.

< Institute's motto >
"Improving the quality of students and employees' lifestyle through regular physical and sports activities."


ÚSTAV TĚLESNÉ
VÝCHOVY A SPORTU
ČVUT V PRAZE



Computing and Information Centre

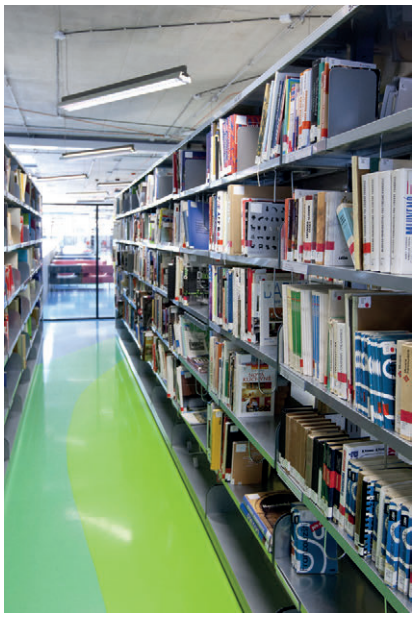
A wide range of ICT services for all faculties and other constituent parts of CTU based on ISO standards and management standards is provided by the Computing and Information Centre. Every day, the results of its work are used by every employee, student or guest, who might not even be aware of it. Primarily, the visible part of our services is specific applications and features linked to studies, science and research, acquiring licences and support to everyday administration work through economic and personnel systems. Many users are not even aware who is the provider of a specific service, or what has to be done to provide such scale of interconnected services. It begins with entering the premises, buildings and laboratories when access is allowed using an ID card issued by the CIC service department based on identity and assigned technical and business roles. After entering a department or a lecture hall, a user will surely get connected to their applications and services through the network infrastructure and can start work. Only this short paragraph shows the range of operational functional infrastructure, agendas small and large that are interconnected and work with a certain logic. At the other end of the spectrum are audio and video broadcasts, including the processing and presentation on the CTU website.

The most important news of 2019 probably is the fact that we experienced no major accidents or safety incidents. In the framework of infrastructure development we enhanced connection to backbone network in Dejvice and on Karlovo Square (redundant dual connection 2x10 GB per building) and external network connection at CTU to 40 GB plus 10 GB reserve. The development of the infrastructure also includes launching of a new generation ORACLE EXADATA in cluster as a database heart of CTU IT. In agendas, the most important advancements include the Implementation of Quantified Criteria for Habilitation Procedure and Procedure to Appoint Professors, Analysis and Implementation of Selected Features of New Assessment of CTU (in the field of R&D), revamped Questionnaire app, support to the Admission Procedure and Applications to Study, new Schedules, Register and connecting the study system with the Records Management (in the field of Study). In the field of administration, eStocktaking was conducted at all constituent parts of CTU, a new electronic document circulation application AEDO (Absence and Representations) was launched and full-scale electronic signatures in PDF format are ready from the technical perspective. A hybrid cloud structure was designed and implemented as a major step forward towards remote communication and electronic services.

CTU Archive

CTU Archive is one of the oldest university archives in the Czech Republic. A specialized archive of its founder, the CTU Archive looks after its archival legacy and explores the history of CTU. The archive's study room is available to the public, and written, visual and audiovisual materials can be studied there. In 2019, the CTU Archive organized exhibitions commemorating two important historical events. The exhibition "Dark Autumn 1939. Fate of CTU and its prominent figures after the closing of universities" was held from 6 November to 20 December. The exhibition was opened at the Masaryk Dormitory, a place of memory where students were violently arrested. The Velvet Autumn at the Czech Technical University in Prague exhibition's opening took place in the contemporary space of the Respirium at the CTU-CIIRC building evoking the atmosphere of the modern era in the history of CTU after 1989. Both expositions were in the form of posters.

The Archive welcomed several excursions; on 6 July the traditional Open Doors Day took place as part of the programme of the International Archives Day. The cooperation with Prof. Marcela Efmertová at the Department of Economics, Management and Humanities, the Faculty of Electrical Engineering continued and a tour of the archive was organized for her students from the Czech Republic and her visiting students from Sorbonne University. The archive also focuses on international cooperation – in July 2019, its representatives attended a conference at the University of Dundee in Scotland organized by the International Council on Archives (ICA). Kamila Mádrová had a presentation at the conference on the Means of Monitoring the Life-Cycle of a Document by Example of Tasks of the CTU Archives. In October, the archive welcomed visitors from the Universitätsarchiv TU Dresden.



CTU Central Library

CTU Central Library is a university workplace that provides library and information support and background for the study, scientific, research, creative and artistic activities at the university. It builds and makes available specialized collections of printed and electronic documents in scientific disciplines cultivated at CTU and runs the CTU Digital Library (institutional repository), an open platform for storing and sharing e-documents created at CTU (graduation theses, published outcomes of scientific activities of authors at CTU and other publications and documents produced at CTU), provides methodological support for uploading documents to the repository and ensures its interconnection with international information infrastructures. It provides support for the development of students' information literacy and is involved in developing their key competences for the study, the future job and lifelong learning, as well as support for the assessment of the outcomes of R&D activities at CTU. The library houses the CTU editor's office of scientific journals, supports publication of scientific journals at CTU in Open Access mode, provides a platform for the administration and publication of electronic journals, assigns publication standards to publications created at CTU.

In 2019, 4,928 new units were added to the library collections. Automated storage of full-text graduation theses from the KOS component continued. A total of 4,126 theses were stored in 2019. Since 2019, the library has extended cooperation with authors regarding open publication of study materials, lectures, course books under the CC licence at the CTU Digital Library. The publications are assigned a permanent DOI identifier, are publicly accessible 24/7 and can be found also using the CTU library catalogue. The launch of automated import of records and full-texts of publication outcomes from the V3S component and their publication in the Digital Library were an important step made in 2019. About 197,000 visits, 870,000 views were made in 2019 and it was used by 128,000 users in 2019.

CTU Publishing House

Publishing House publishes mainly course books, university text books and specialized literature and selected periodicals (Pražská Technika and TecniCall), prepares promotional and informational materials and other publications produced at CTU. It takes care of books published as part of publication series at CTU – from contracts, consultations with authors to graphic design of selected publications and preprint preparation of further books. It also looks after the ISBN agenda. In 2019, electronic versions of course books and other publications were added to the university e-shop. Payments by card are finally possible in the e-shop. Thanks to changes in legislation this option is available also for payments from abroad. Our publications are popular also among general public, selected publications (primarily by authors-architects) that are professional not only in terms of the content but also the graphic design, are great PR for the university, and as they sold out very quickly, the Publishing House reprinted them. Another major feat in 2019 was the preparation and approval of the new CTU Publishing Rules regulating the activity of the Publishing House and other departments with effect from 1 April 2019. Among other things, the Rules streamline the process of approval of books in book series and include publication standards for electronic publications. The presentation of the CTU Publishing House at the 26th Book World International Fair 2019 and the events organized at the CTU stall attracted many visitors. A launch of the book "Věda v českých zemích" (Science in the Czech Lands) by renowned author Prof. Ivo Kraus of the Faculty of Nuclear Sciences and Physical Engineering was attended by so many guests and attracted so many fans of scientific literature and literature in general produced by the CTU Publishing House that the whole area was literally swarming. The fair broke a record as the number of visitors surpassed 50,000 and so did the stall of the CTU Publishing House, which sold twice as many books as it did in the previous year (worth nearly CZK 30,000). Another book published in 2019 – "Beton, Břasy, Boletice / Praha na vlně brutalismu" (Concrete, Břasy, Boletice / Prague Surfing the Wave of Brutalism) by Petr Vorlík and Klára Brůhová of the Faculty of Architecture was this year's bestseller, followed by "Věda v českých zemích".

Service Facilities Administration

Service Facilities Administration is a CTU special-purpose service facility in charge of accommodation and catering for students, staff and hotel guests. The administration provides a full range of catering and congress services at our own facilities, runs outdoor sport facilities at the dormitories and administers and rents out non-residential space to entrepreneurs. It also is in charge of the Bethlehem Chapel – a national cultural monument, which is used all year round for social, cultural and science events.

The SFA Accommodation Department administers the Hlávkova Dormitory in Prague 2 and segments of dormitories in Prague 4 in Podolí and in Prague 6 in Strahov as well as dormitories: Bubenečská, Orlík, Sinkuleho, Dejvická, Masarykova. This department is the "leader" among SFA departments. It strives to use the available capacity to meet the accommodation needs of students or graduates from CTU and other universities. In order to maintain and increase the quality of accommodation, the furniture, electrical appliances, textile, washing machines and dryers are regularly refurbished. Also the technical level of the premises keeps rising. Thanks to a long-term cooperation, student representatives are involved in creating leisure time facilities (club rooms, sports activities, support of social events). At the same time, SFA carries out additional accommodation activities by selling vacant accommodation capacity as hostels and to the public.

The SFA Catering Department administers five canteens in Prague – Strahov, Studentský dům, Technická, Podolí, Masarykova Dormitory, three buffets – Horská, Karlovo Square, Megabufet, and a coffee house Archicafé. Another SFA canteen is located at Kokos in Kladno.

On 29 August 2019, the CTU Service Facilities Administration signed a Contract on Energy Performance Contracting with a selected bidder – ENESA a.s. under an over-threshold public contract on services commissioned in a negotiated procedure with publication according to Act No. 134/2016 Coll., on Public Procurement. The project is implemented in the form of Energy Performance Contracting (EPC), when the investment is paid back with the money that was saved and the supplier has contractually guaranteed the savings, or else the supplier has to cover the difference. The client does not have to invest own money in the renovation as the installation of energy-saving measures is paid from the money that was not spent on energy. In 2019, the preparation of a project to start construction and energy-saving measures that will be carried out in the first half of 2020 in five CTU complexes in Prague and will lead to energy savings of up to CZK 20 million a year began. The renovation will also ensure a better-quality environment for students and reduce CO2 emissions by 4,125 tonnes. Thanks to the EPC scheme, CTU will save 26% of its current expenditures on electrical energy and water. The investment in renovation of heating, air-conditioning, lighting, new windows and thermal insulation will save CZK 220 million without VAT. Part of the investment will be covered from a grant from the Operational Programme Environment. The measures will be implemented in 2020 and the energy/financial savings are guaranteed from the beginning of 2021 till the beginning of 2031.









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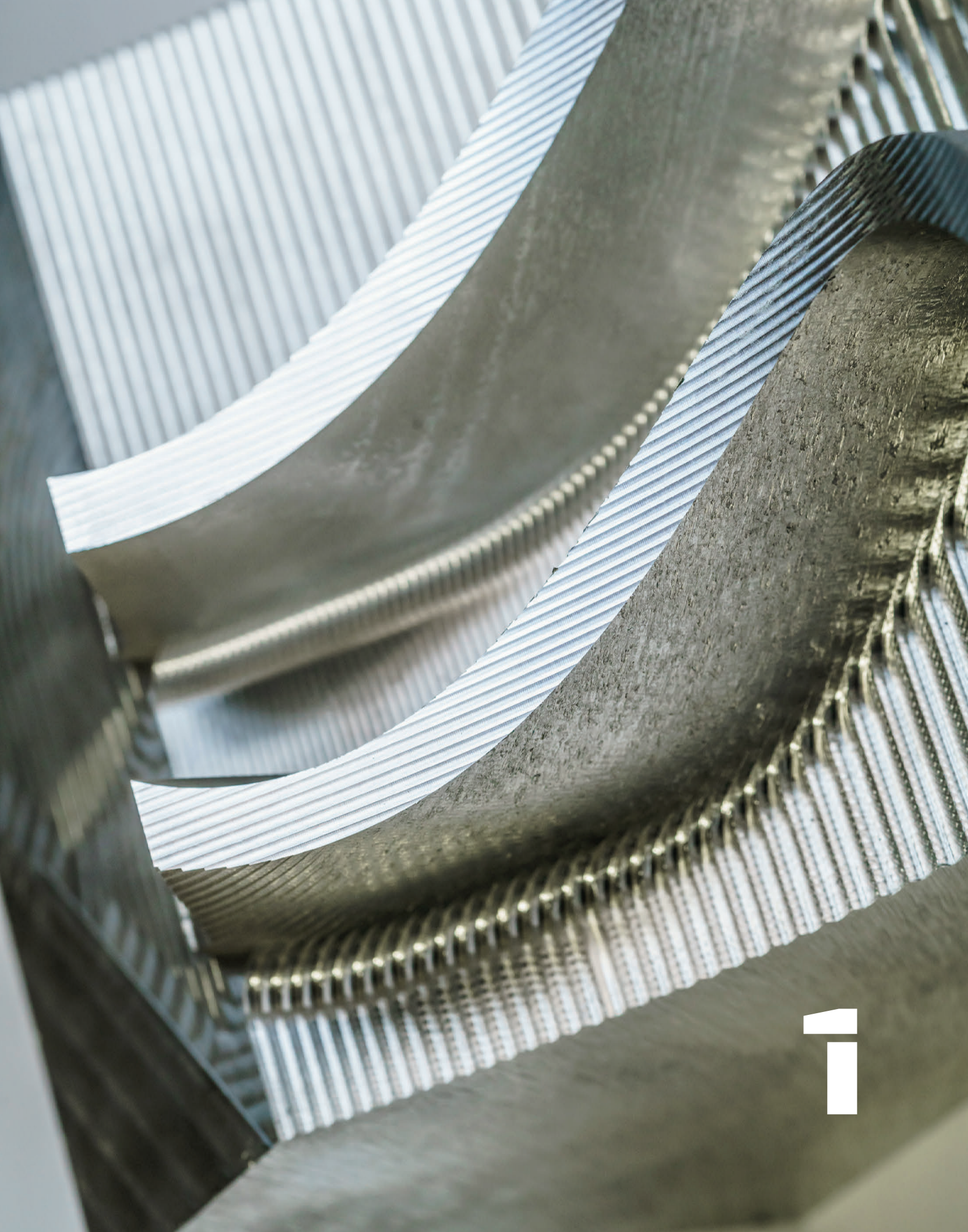


1 Basic facts

CZECH TECHNICAL UNIVERSITY IN PRAGUE
Address:
Jugoslávských partyzánů 1580/3
160 00 Prague 6 – Dejvice

Czech Technical University in Prague is a public university established under Act No. 111/1998 Coll., on Higher Education Institutions. Pursuant to the Act, the statutory body of CTU is the Rector – doc. RNDr. Vojtěch Petráček, CSc.

CTU comprises eight faculties, six university institutes, special-purpose service facilities, namely the CTU Rector's Office (Rectorate), the Service Facilities Administration (SFA), Česká Technika – CTU Publishing House (ČTN), and other constituent parts, namely the Computing and Information Centre (CIC) and the CTU Central Library (ÚK). The organizational chart of CTU, the composition of individual bodies of CTU that are responsible for all decision-making processes, together with the CTU representatives in the representation of Czech universities and other information can be found **in the Table Annex to the Annual Report, Section 1**.

MISSION, VISION AND STRATEGIC GOALS

In 2019, the Czech Technical University in Prague strengthened its visions and fulfilled its strategic goals in individual areas through participation in international projects and cooperation with renowned scientific teams and external partners. At the same time, CTU focused on partial projects aimed at the development of the organization from within, using projects implemented in the framework of the Institutional Plan (IP), the Centralized Development Plan (CDP) for the development of the university as a whole and other projects implemented under the CTU Fund for the Support of Schoolwide Activities (FSSA).

CTU fulfilled its mission primarily through strengthening international cooperation, enhancing partnerships with industry and the public administration in the Czech Republic in line with government strategies, including the 2020-2030 Innovation Strategy, which puts a strong focus on interconnection and transfer of knowledge from science to application in production. Thanks to its active participation in the preparation of new strategic documents for the next financing period, CTU is able to manage its internal processes in order to improve its position and perception by society, while also increasing the quality of education achieved by its students.

The wide range of disciplines and the heterogeneity of CTU allowed the faculties and university institutes at CTU to make use of various opportunities to come closer to the fulfilment of the CTU mission and strategic goals, based on the following vision.

Mission

"In the future we want to remain a research university that will educate further generations of graduates and scientists with technical and general skills to satisfy the fast-changing requirements and needs of the decades to come."

Vision of CTU

"The Czech Technical University in Prague will strengthen its position as a leading technical university in the Czech Republic, and its position as a globally recognized research university that develops the talent and competences of its students, academic and other workers. It will strive to fulfil its function as a respected authority in education, scientific, research, artistic and engineering creative activities, for which it will use the experience of the previous generations of engineers and architects and the skills of the current and future academic workers and students."

CTU INTERNAL REGULATIONS IN 2019

In 2019, several changes were made in the CTU internal regulations in the form of changes in financial amounts stipulated by individual regulations, or made in response to the need to improve the internal structure of CTU. All changes were made so that they come into effect in time before the start of the 2019/2020 academic year.

With effect from 31 January 2019, the CTU Statute was amended and also Annex No. 5 to the CTU Statute was amended regarding fees connected with study.

The CTU Rules for Granting Scholarship were amended with effect from 1 August 2019. The change concerned the possibility to grant merit scholarships also for studies in previous bachelor study programmes to students who continue in bachelor study programmes. This possibility is available in case the student previously studied in a bachelor study programme at another university. Another major part of the changes concerned scholarships for doctoral students. The aim was to implement a higher motivation component in this tool.

The end of the summer semester also was a time of reconsidering of the position of individual roles in the CTU Academic Senate. A change to the Rules of Procedure of the CTU Academic Senate was approved with effect from 5 August 2019 and concerned the insertion of a new Article 3b under the title AS CTU Secretary. The article regulates the position, tasks and powers of the Secretary of the CTU Academic Senate.

The CTU Salary Regulation is a living document that has to respond to changes in legislation, including changes in pay grades and provisions regarding previous work practice, as well as the needs for creation of project teams and expert groups participating in strategic management. Therefore, the change in the Salary Regulation included, among other things, a new paragraph on the possibility of a project bonus, a salary component without entitlement provided from specific funds.

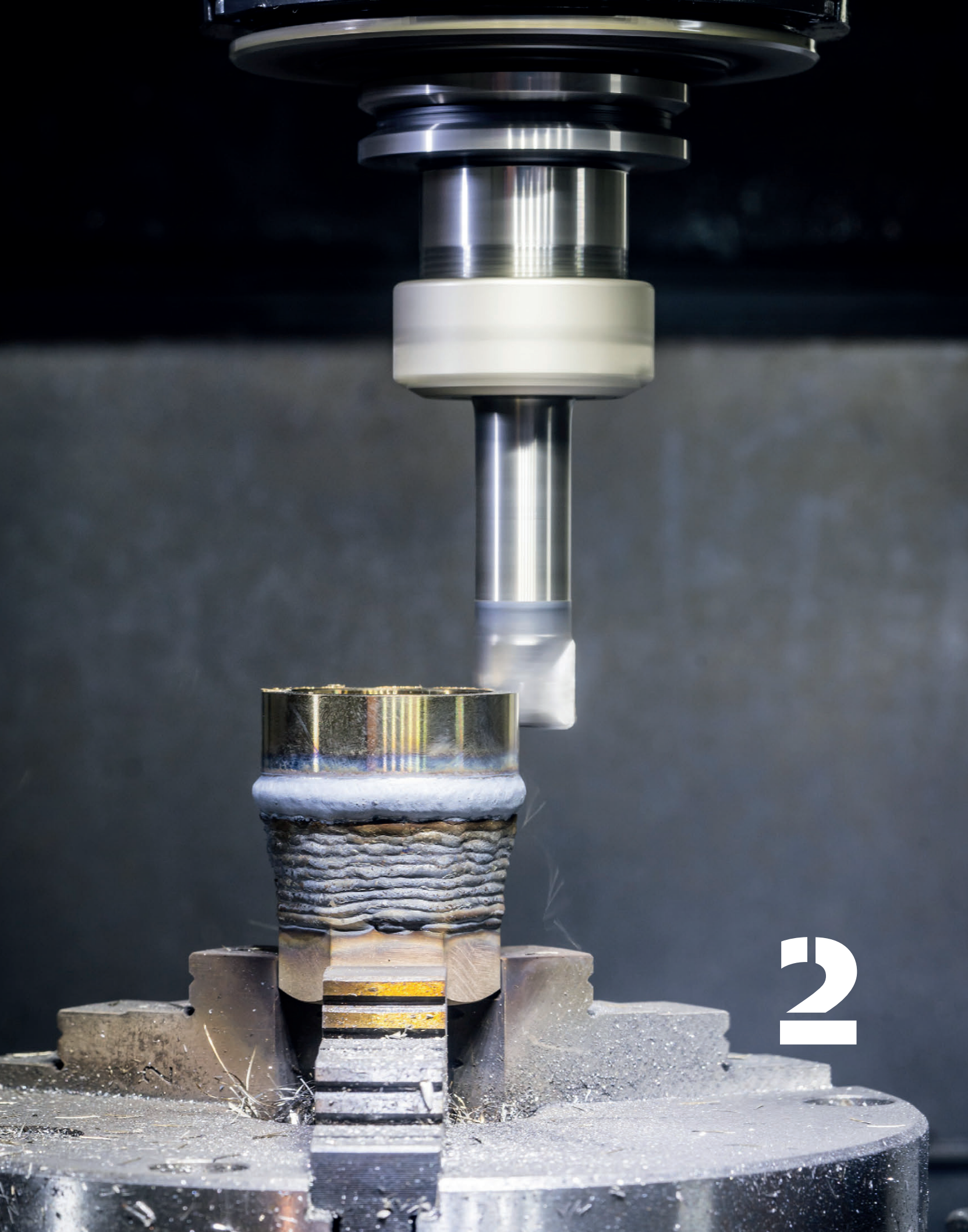
With effect from 16 June 2019, CTU Accommodation Rules were approved, replacing the previous regulation registered by the Ministry of Education, Youth and Sports on 1 September 2017.

Since 1 October 2019, some organizational changes were made in the work of individual vice-rectors in response to requirements of strategic management and division of competences.

DISCLOSURE OF INFORMATION PURSUANT TO SECTION 18, ACT NO. 106/1999 COLL., ON FREE ACCESS TO INFORMATION

In 2019, a total of 16 applications for disclosure of information were submitted to CTU. This means that the number had doubled compared to 2018. Four applications were rejected and two appeals were submitted against the decision to reject an application. One complaint was submitted pursuant to Section 16(a) of the Act in 2019.

No judgement was issued on review of legality of a decision to reject an application for disclosure of information and no exclusive licences were provided. Costs of legal proceedings on disclosure of information pursuant to the Act on Free Access to Information were zero in 2019.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Doc. Dr. Ing. Gabriela Achtenová / Vice-Rector for Bachelor and Master Studies

"CTU in Prague is a leading research university, which of course does not mean that we pay no attention to our students. Students are directly involved in research projects. A big part of funds obtained from EU projects was invested in the modernization of laboratory practicals; the majority of implemented outcomes were carried out in 2019. New study programmes were accredited, the focus and content of which responds to the new direction of development, research and needs of society. In 2019, a number of educational activities were carried out that focused mostly on our students and support of their studies. It is a joy to teach young talented people = students at CTU."

2 Study programmes, organization of studies and educational activities

The year 2019 brought about several major changes in the organization of the studies. The first outcome was the new bilingual diploma that all graduates received for the first time at the graduation ceremony at the beginning of 2019. The bilingual diploma was introduced across all types of studies – bachelor, master and doctoral. Since 1 February 2019, a bilingual diploma duplicate was also introduced (for diplomas not older than 10 years). Also the diploma supplement was changed slightly.

In 2019, the admission procedure underwent certain changes. We were able to make all necessary changes in the course of one year. An analysis of the current process was conducted, new print reports of individual decisions in the admission procedure were proposed, and only in the final phase the design and programming of the admission procedure with fully electronic application for study, available at prihlaska.cvut.cz were designed. The new design can be used for all types of studies, i.e. bachelor, master and doctoral. At the same time, the connection of the generated documents and electronic applications to the records management was automated. Full use for the admission procedure in the 2019/2020 academic year mainly concerned bachelor and follow-up master study programmes.

An important source of feedback on the quality of teaching is the student Questionnaire. Every constituent part has a different approach to the increase in the number of respondents. A significant impetus was the change in the function and design of the student Questionnaire, which was used across all CTU constituent parts. Thanks to the changes, the number of respondents increased by 10-20%, depending on the constituent parts.

Other changes proposed and implemented in 2019 concerned lifelong learning. Lifelong learning is a very broad concept. The aim was to design a unified system for the widest possible area of lifelong learning. The analyses that started in 2018 and were completed in 2019 resulted in a proposal for process changes and design of a new portal where all lifelong learning courses would be administered, except for the University for Kids and subjects from accredited study programmes. The new portal czv.cvut.cz delivers not only a clearly laid out range of courses but also easy registration, including the possibility to make electronic payments directly from the portal. The portal is also used by administrative staff and teachers as a tool for administration, generating statistics, monitoring of participation, information for participants, etc.

The last of the significant changes that took place in 2019 was the finalization and publication of the new Publishing Rules. Thanks to the adopted principles, the process of approving of publication of course books was significantly shortened in order to be able to respond more flexibly to student demand. Also forms for entering all types of publications in Česká Technika – CTU Publishing House were made simpler.

ACCREDITED STUDY PROGRAMMES

In 2019, CTU implemented a total of 188 study programmes or fields, of which 50 were bachelor, 68 follow-up master and 70 doctoral study programmes. They included both full-time and part-time forms of study, where the full-time form prevailed over the part-time form in a ratio of 4:1 in bachelor and follow-up master study programmes, while in doctoral study programmes the ratio was significantly higher – 2:1 in favour of full-time form of study.

Compared to 2018, the total number of accredited study programmes decreased in 2019 – from 252 to the aforementioned 188. This difference, however, is due to a change in the methodology, which includes the number of programmes in which students were enrolled. Had the methodology not been changed, the number of accredited study programmes would have actually increased. For comparison, it should be mentioned here that in 2019 CTU had 17,229 students. Of these, almost 5,500 were women and 3,106 foreigners, which represents a slight increase compared to 2018, when 3,050 foreigners studied at CTU. In 2019, there was a slight decrease in the total number of

students; in 2018, there were 17,610 students at CTU. It is clear that CTU is able to increase the number of foreign students, while maintaining and even increasing the quality of studies. A graph showing the trend in the number of accredited study programmes attended by students is given in the Table Annex, Section 2, together with more detailed information on studies in 2019.

The change in the methodology for reporting the number of study programmes and the change in the Higher Education Act concerning the accreditation of study programmes led to an overall reduction in the number of accredited study programmes, and thus to a reduction in the number of study programmes in a foreign language, of which there were 44 in 2019, while in 2018 there were 83 of them. The fact that there was actually a slight increase in the number of students in accredited study programmes in a foreign language is a proof that the change in the number of reported programmes was due to the change in methodology.

In 2019, 9 study programmes were implemented together with another university or research organization, with a total of 110 active studies. Close ties were created between specializations of the Faculty of Electrical Engineering and the 1st Faculty of Medicine of Charles University, between Mathematical Engineering at the Faculty of Nuclear Sciences and Physical Engineering and and the Czech Academy of Sciences, and between the Faculty of Mechanical Engineering and the University of South Bohemia in České Budějovice.

LIFELONG LEARNING COURSES

CTU has long been a centre of education in technical disciplines, which are increasingly more reflected in social sciences and are an inseparable part of civil engineering, design and architecture, where CTU has a unique position.

In 2019, 370 lifelong learning courses were implemented, in which participants were enrolled. Their number is again lower by almost a half due to the change in methodology, because these are courses in which participants were enrolled, but the total number of courses on offer is on par with 2018, or even a little higher. Again, the majority of courses were job-oriented in the field of ISCED-F Engineering, Manufacturing and Construction, ranging from 16 to 100 hours. A total of 84 courses were implemented in this field of education. Other areas followed with a significantly smaller number of courses: Natural Sciences, Mathematics and Statistics, with 23 courses of equal scope. Courses in all other fields of education did not exceed a total number of 10, except for free time courses, of which there were 61 courses ranging from 16 to 100 hours. In the field of humanities, 28 courses were implemented (more than 100 hours). It is also worth mentioning the 53 courses at the University of the Third Age, which were implemented in the field of education in Social Sciences, Journalism and Information Science.

COOPERATION WITH THE APPLICATION SECTOR

The study programmes at CTU reflect the development of social challenges in all areas of activities of CTU. Individual faculties and university institutes appoint outside experts to committees that assess bachelor and master theses and also involve them in teaching. Most qualification theses are commissioned in accordance with the requirements of practice and in cooperation with outside experts, as is the case, for example, at the Faculty of Information Technology, the Faculty of Civil Engineering or the Faculty of Mechanical Engineering. The outcomes of creative activity in the field of science and research and from practice are often included in instruction of specialized subjects and implemented in specific teaching materials, which makes them more interesting for students. Students also have an opportunity to participate in the solution of research projects in the form of the CTU Student Grant Competition or to directly participate in external research and development grants implemented at the Faculty of Mechanical Engineering and the Faculty of Information Technology.

At the Faculty of Mechanical Engineering, each field of study implemented at the faculty has its representative from the application sector on the Scientific Council, where proposals for study programmes are discussed and approved.

Some faculties, such as the Faculty of Transportation Sciences, have been closely tied with the application sector since their establishment, as well as with the state administration and local governments. Project teaching is largely implemented in cooperation with industry. Experts from the industry are directly involved, together with teachers at the faculty, in this form of specialized instruction. Established contacts serve also as effective feedback for the creation of study programmes.

At the Faculty of Architecture, outside experts are involved in theroretical instruction and most importantly in studio instruction. Architectural and design studios are led by erudite practicing architects and designers. In this way, students are acquainted with modern methods and approaches in the given field and enhance their employability after the completion of their studies. Outside experts are also present at final presentations and assessment of studio projects and are also external members of state final examination commitees and committees for the presentation and defence of theses.

The Faculty of Nuclear Sciences and Physical Engineering works very closely with, for example, ČEZ Group, the Proton Center and CA Technologies, which significantly strengthens its role in society. ČEZ Group, together with other companies (such as Českomoravský beton, a.s., Metrostav, a.s., Skanska, a.s.), are also industrial partners of the Klokner Institute, whose students solve current problems faced by the industry in their dissertation theses.

OTHER EDUCATIONAL ACTIVITIES

CTU is fully aware of the dynamics of the development in society towards higher use of technologies and is significantly involved in these changes. In 2019, a number of educational activities

were carried out, which were focused mainly on our students and support for their studies. Bachelor, master and dissertation theses are commissioned on the basis of problems identified in different industry branches, and often directly in cooperation with or under co-supervision by an industrial partner.

In addition to courses for students at CTU, many regular seminars and educational activities were organized and co-organized for high school and primary school students, which were aimed at increasing their interest in technical education, which is increasingly in demand by employers. Student activities also include the organization of competitions and assistance in Olympics in mathematics, physics and chemistry.

As always, CTU also organized events aimed at the professional community and general public, which significantly affect the overall perception of CTU in society. They included various lecture series organized by faculties according to their specialization, thematic workshops and specialized as well as other events organized, for example, by the CTU Archive.

3

3 Students

ACADEMIC FAILURE

Academic failure was an area that still required a lot of attention in 2019. Compared to 2018, there was a small improvement as the total study failure dropped from 31% to 30.2%. The biggest improvement could be noticed at the Faculty of Architecture, which had a failure rate of only 13.4% in 2019 compared to 20% in 2018. At the Faculty of Civil Engineering, the Faculty of Mechanical Engineering, the Faculty of Electrical Engineering and the Faculty of Transportation Sciences the failure rate dropped by single-digit percentages, while the Faculty of Information Technology and the Faculty of Nuclear Sciences and Physical Engineering and other university departments still had the same rate of academic failure. All data and information on the structure of students in individual fields of study and degree levels, together with granted scholarships, can be found **in the Table Annex, Section 3**.

Every year we see that students come from high schools with different levels of knowledge, especially in mathematics, so it is necessary to level off the differences already at the beginning of their studies and prepare them for the demanding study, which is based primarily on mathematical sciences. In previous years, various forms of preparatory courses proved useful for the individual constituent parts of CTU, such as the regular summer course in Introduction to Computer Science organized by the Faculty of Information Technology, which provides applicants with further knowledge they will need for a successful study. The Faculty of Nuclear Sciences and Physical Engineering organizes courses in mathematics in order to prepare applicants for the study as well as for example, a course called A Minimum in Mathematics as a supplement to the basic course in mathematics at FNSPE or FIT. The Faculty of Biomedical Engineering has a unique offer, as it prepares a weekly summer course for its future students with an introduction to biology, physics, mathematics and chemistry. In 2019, a course was also prepared for students of Physiotherapy that focused mainly on the presentation of how anatomy is taught and on improving students' physical fitness.

In 2019, also preparatory courses for entrance examinations to bachelor and follow-up master degree programmes were organized as usual.

After overcoming the initial problems at the start of their study, students in higher years of study need some additional tutoring to prepare for the exams, which is carried out by tutors who are responsible to the Vice-Dean for Student Affairs at FNSPE.

The Faculty of Mechanical Engineering has a two-speed approach aimed at reducing academic failure. AT FME, studies in bachelor study programmes are spread over four years and the examinations are of two levels - alpha/beta. Students that pass their exams at the higher alpha level will receive a bachelor degree after three years and are admitted to the follow-up master degree study without the need to take an entrance examination. Students that pass their exams at the lower beta level will receive a bachelor degree oriented towards practice after four years of study and will be accepted to the follow-up master degree study only after passing an entrance examination that focuses on the differences in knowledge between the alpha and beta levels. This had resulted in the reduction of academic failure by 15% after in the first year of bachelor study. The second method is the use of artificial intelligence. Using the methods of machine learning, the Faculty of Mechanical Engineering creates „tailor-made" models of behaviour of a successful and unsuccessful student. The aim is to predict the risk of academic failure and to inform the students at risk in time and offer them advice and assistance (without lowering the level) when it is still possible. This resulted in a 49% reduction in failure rates after the first semester, which solves the problem with the transition from high school to university. This method will reduce the overall failure rate by 5%. Had the above procedures not been used or had only half of the students been accepted following tests beyond the level of mathematics at the Maturita exam, about 100 fewer engineers would complete their studies each year. In the future, the faculty will devise a third method consisting of private tutoring of students, in other words private teachers – most probably older students.

In 2019, also the results achieved at the Faculty of Architecture were very interesting, as the faculy has long shown a very low rate of academic failure in both bachelor and follow-up master study programmes. Despite the low failure rate, the faculty organizes additional courses of drawing for students who are preparing to resit their examination, or who have failed to enrol for the course, and remedial courses in mathematics. The faculty management monitors and analyses the number of successfully completed studies.

FINAL DECISIONS TO DECLARE INVALID

In the course of 2019, no final decisions to declare invalid a state final examination or presentation and defence of dissertation thesis or appointment of docents were issued at CTU in Prague according to Section 47c, Section 47f and Section 47g, or according to Section 74a, Section 74d and Section 74e of Act No. 111/1998 Coll.

REDUCING THE EXTENSION OF STUDY PERIOD

Academic failure and measures taken to reduce the extension of study period are interconnected and it is clear that according to their capabilities the individual faculties focus primarily on students mastering of the basics, which in turn makes it easier to achieve success in study. As mentioned above, the use of various tutors and an individual approach to students work very well. The offer of various levelling courses is constantly growing and they offer students the opportunity to acquire knowledge that they lack and need for the completion of compulsory subjects, as is the case, for example, at the Faculty of Architecture. At FA, some subjects are offered in both summer and winter semesters in order to allow students to enrol in a course they have failed without a lapse.

The Faculty of Biomedical Engineering has made an analysis of individual subjects. It has taken measures in the framework of fields of study/programmes, such as reducing the maximum capacity of practical classes was reduced in core subjects so that teachers could individually engage with students. Typical examination tasks were studied in lectures and practical classes; for some subjects typical examination tasks, including entries from previous years, were available directly on the website of the given subject. Selected profile subjects were supplemented by lectures by outside experts on certain topics.

Another important measure that leads to the reduction of the extension of study period is access to study materials; therefore, the library collection is constantly supplemented and updated presentations and study materials are available on the websites of individual subjects. The MOODLE CTU platform is an integral part of making study support materials available to students.

In order to help students who are preparing their final theses, a number of seminars and other events were organized, such as the so-called "Citation Thursdays" intended primarily for students in the last years of study (consultations on citations, citation managers and copyright).

SCHOLARSHIPS

Scholarships are a motivation element used by CTU to support exceptionally talented or otherwise excellent students. The support is aimed at participation in study stays abroad and at faculty events and as a reward for excellent bachelor and master theses. Also the best studio projects are rewarded in this way. Scholarship programmes are also used to alleviate difficult social conditions, so that students can successfully complete their studies. Each faculty uses scholarship programmes differently, but always in accordance with the CTU Rules for Granting Scholarships.

In addition to the traditional awards mentioned above, some faculties also supported successful high school students or the best first-year students for an excellent presentation of the field of study or faculty, which contributes to the CTU goodwill in general.

SERVICES FOR STUDENTS AT CTU

CTU is aware of the need to help students solve different situations that they may find themselves in in the course of their studies. The CTU Information and Consultancy Centre (CIPS) and the CTU Career Centre serve this purpose. The centres are used by all faculties and the aim is to constantly increase the professional qualifications of the centre's staff, so that the services provided are of the highest quality and in line with students' needs.

CTU Information and Consultancy Centre (CIPS)

All CIPS activities are aimed at supporting students at CTU to succeed in their studies and also in their professional and personal lives. It focuses on first year students, beginning with their enrolment, during which assistance is offered to anyone who faces difficulties on entering the university. Information is made available to everybody about the support and assistance provided by the centre for dealing with problems linked with studies and with adapting to the new social and study environment, as well as later on during their studies.

The centre offers individual study, psychological, social, legal and spiritual consultations to CTU students, with special emphasis on dealing with difficult situations.

In the course of the academic year, the centre also organizes events aimed at helping students acquire the necessary competences for their studies, and for their professional and personal lives. Seminars, lectures and workshops are held during the semester focusing on the development of study skills, support of creativity and personal development.

Other forms of counselling are offered to students as part of an institutional project: couching, speech training, financial counselling, support to female students, work in groups and seminars for doctoral students.

All centre's activities are aimed at creating an environment for students at CTU which reduces the barriers they are confronted with during their studies and which reduces the number of students who drop out prematurely and unnecessarily. The main focus of CIPS is on working with students who have problems

with procrastination and with addiction to computers. The centre cooperates intensively with ELSA, the Guidance and Support Centre for Students with Special Needs, and with study departments at individual faculties and institutes.

CTU Career Centre

Thanks to its unique position and perception by society, including also future employers, CTU in Prague can guarantee to a certain extent future employment of its students. All faculties and university institutes cooperate with the private sector, and therefore students are usually able to find employment immediately after graduation. At the same time, thanks to its Career Centre, CTU provides services for students' personal development and their preparation for a successful career in the future. For this purpose, we offer the services of personal counselling office, where students can prepare for a job interview using a video interview as a modern method of interviewing with psychological diagnostics. It also includes tips on how to write a good CV and a cover letter. Another important service is a career counselling office which recommends students the best future direction and provides an analysis of strengths and weaknesses together with the recommended working style and how to be efficient at work.

Generally speaking, the centre helps students to get to know themselves and be able to apply their strengths in what they do. It shows students how the labour market operates and helps them become more attractive for future employers, either by improving their self-presentation or gaining experience. It complements the students' expert knowledge with soft skills, which are very important today, including communication skills and other skills that are needed in life. It also helps students find solutions when they encounter problems at work, in their studies or personal lives, provides them with the right contacts and motivates them to find solutions.

The Career Centre provides services to students and graduates within three years of their graduation and now also to CTU employees. The centre uses various methods of coaching, mentoring or personal testing. Last but not least, the centre participates in trade fairs and student events, manages a Facebook account and a website on which it advertises vacancies and informs about its services. For the centre to be able to operate successfully, it needs to cooperate with companies and maintain awareness of the development and needs of the labour market.

SUPPORT TO STUDENTS WITH SPECIFIC NEEDS

Assistance to students at with physical, visual and hearing impairments, students with special learning disabilities including ADHD (Attention Deficit Hyperactivity Disorder), students with autistic spectrum disorders and students with other impairments (students with chronic diseases, psychological diseases or disorders, impaired speech or other communication abilities) was provided by ELSA, the Guidance and Support Centre for Students with Special Needs (Department of Studies and Student Affairs, CTU Rector's Office).

Services at the centre beyond the standard provision of specialized consultations were provided in accordance with a document issued by the Ministry of Education, Youth and Sports that specifies general conditions for organizing the studies of students with special needs and includes methodological guidelines for fulfilling the requirements. This document was supplemented by the Methodological Guidelines on Support for Students with Special Needs at CTU.

Modifications of conditions for studies were implemented in close cooperation with faculties and institutes at CTU, primarily through direct work of teachers, contact persons and employees of the study departments.

In 2019, a total of 89 students registered at CTU made use of the study support services in one of the areas of digitization and library services for providing study literature in an accessible electronic form. Next, visualization and transcription services were used for interpreting to sign language and simultaneous transcription. Personal and study assistance services and technical services, such as loans of assistive technologies play an important role. An inseparable part of the provided services is functional diagnostics, diagnostics of specific study disabilities and the ensuing modification of the regime of classes and examinations with individual classes and time compensation.

The services provided by the ELSA Centre included involvement in organizing entrance examinations for study applicants with special needs. Applicants can ask for modified entrance examinations when filling in the electronic application form and they can ask for modified study conditions.

Teachers at faculties and university institutes are regularly informed about students with special needs who are registered with the ELSA centre and are provided with instructions from experts at the centre on how to communicate and work with such students.

An important part of supporting students with special needs was the construction of the ATELION assistive technology studio. In this way, the ELSA centre can also provide methodological trainings in the use of assistive technologies and aids both for students with special needs and for teachers and other staff at CTU.

In 2019, innovations were made in the production of tactile plans and maps for the visually impaired, including a special edition of maps in cooperation with Mapy.cz.

EXCEPTIONALLY TALENTED STUDENTS

Excellence is one of the goals that take the university to a higher level in the perception of society. At all faculties and institutes where young people study, CTU is aware of the need to support exceptionally talented students who may be part of excellent scientific teams in the future not only in the Czech Republic but also abroad.

The support to and search for talented students begins already at high schools, where teachers from, for example, the Faculty of Nuclear Sciences and Physical Engineering help organize Olympics in mathematics, chemistry and physics. Many faculties, such as the Faculty of Biomedical Engineering or the

Faculty of Information Technology, have concluded agreements on cooperation with high schools where teachers from the faculties work and in this way have the opportunity to establish contacts with talented students. The Faculty of Electrical Engineering develops this cooperation in the form of a "Faculty School" and students have the opportunity to work on their Maturita theses in the FEE laboratories.

Another chance for talented students to receive special treatment is in the first year of studies, where motivation scholarships are offered to the best students, which is the case at the Faculty of Mechanical Engineering. At the Faculty of Civil Engineering, exceptionally talented students are put in a special selective study class group where they are offered special optional courses.

Internships abroad are the highest type of support and also a huge motivation for students in higher years of study with a certain amount of knowledge. We can mention participation in projects at scientific workplaces in Europe and around the world, including laboratories at CERN for students of the Faculty of Nuclear Sciences and Physical Engineering or an annual six-month internship for one student of the Faculty of Architecture in one of the prestigious European architectural studios. The Masaryk Institute of Advanced Studies does not lag behind and offers selected talented students cooperation within the International Office, where they solve the challenging tasks of internationalization together with international experts.

SUPPORT IN DIFFICULT LIFE SITUATIONS

CTU in Prague is attended by over 17,000 students who encounter various life situations during their studies with which they need help. Faculties solve each student's situations on an individual basis. At the same time, students can use the services of the CIPS and ELSA centres that are available to students at all constituent parts of CTU.

It has already been mentioned that scholarship programmes are used not only to support and reward talented students, but also to overcome certain social economic disadvantages. Scholarships are awarded by faculties on the basis of an application and submitted documents that prove that a student is disadvantaged. Subsequently, the faculty's dean will grant an individual social scholarship. Faculties usually have people at their study departments who work as coordinators or consultants and cooperate closely with the ELSA centre and try to find the best solution for each given student. In addition to financial assistance, this may include, for example, a modification of the study plan or other advantages.

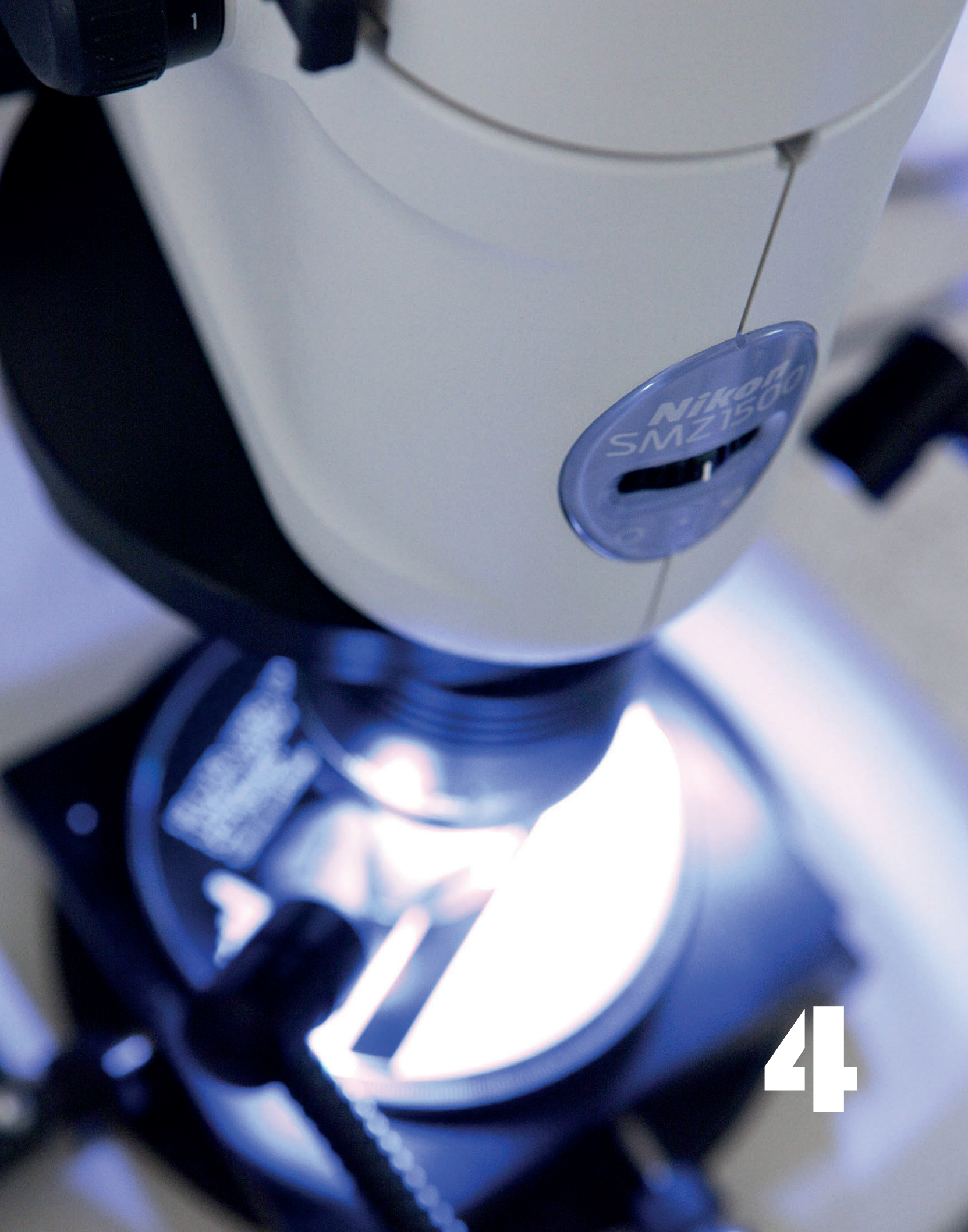
STUDENTS PARENTS

The role of a parent is a role with a lot of responsibility towards the whole society. The role of a student parent is a multiple one, and it is also up to the university what conditions it will set up for those who acquired this role during their studies or who already started their studies as parents.

At the end of 2018, an amendment to the Study and Examination Rules was approved which has been fully applied in instruction since 2019. As part of this change, the maximum length of study was extended and the deadline for fulfilling study obligations for students-parents was extended.

CTU set up the university primary school and kindergarten Lvíčata, intended for children of CTU students and employees. Education at the CTU primary school and kindergarten is focused on the support of development of skills in technical disciplines and natural sciences. Children are also acquainted with the life at the university.

Already in recent years, measures were taken to meet the needs of parents at CTU. In addition to these measures, faculties offer individual approach to students and counselling or modification of the study plan as well as the possibility of interruption of studies, extending deadlines or deducting the recognized period of parenthood from the total period of study.



4

4 Graduates

COOPERATION WITH GRADUATES

In 2014, the Association of Alumni and Friends of CTU (www.absolventicvut.cz) was established at CTU. In 2019, the Association organized several social an educational events for its members, which included lectures of renowned alumni and other interesting guests as well as excursions (FNSPE research department, laboratory at the Faculty of Civil Engineering in Roztoky near Prague, laser centre in Dolní Břežany) and sports and social events, including the regular Dragon Boat race organized by CTU and the VItava Run race. The Association members were also regularly invited to social events held by CTU in 2018 (such as the ball, concerts, colloquia, etc.). We communicate with members of the Association via regular emails and through a website, whose new version was launched in 2019. To be better able to share information with alumni, we have also set up a Facebook account and a group on LinkedIn, where CTU communicates with its graduates.

Various social and specialized events are held at individual faculties to keep in touch with graduates. For example, the Faculty of Information Technology and the Faculty of Biomedical Engineering regularly organize meetings of graduates in February and November. The graduates greatly appreciate the opportunity to meet informally and share their work experiences. The Faculty of Mechanical Engineering has a system established for graduates that is used for sending an irregularly published electronic magazine about news at the faculty. The Faculty of Civil Engineering organizes guided tours for its graduates as part of the Open Doors Day for those interested in studies at the faculty. Another expert tool under development for the internal sharing of information on science and research will be employed at the Faculty of Transport, into which the faculty's graduates will be integrated after resolving issues related to the GDPR and cyber security. All faculties use similar communication tools in order to keep in touch with their graduates not only to evaluate the success of studies in retrospect, but also to explore the possibility of their involvement in the faculty's activities or to inform about the achievements of their graduates in press monitoring and in this way strengthen CTU's goodwill. The systematic efforts undertaken by the Faculty of Architecture are starting to pay off. The information that a person is a graduate of FA CTU is automatically mentioned in the media more often now.

Students of the Faculty of Biomedical Engineering and of the Klokner Institute graduate in very specific fields of study and consequently also the choice of jobs is very specific. In addition to social events, graduates often participate as experts from practice in professional conferences organized by FBME and KI. Examples include the WTA conference organized by the Klokner Institute and the International Eye Optics, Optometry and Ophthalmology Fair held in March, attended by representatives of the Faculty of Biomedical Engineering.

An overview of the number of graduates is given **in the Table Annex, Section 4**.

EMPLOYABILITY OF GRADUATES

Employability of CTU students is very important not only for the university's feedback on the quality of studies and connection to practice, but also for study applicants, whose interest to study at CTU is also weighted against their future chances on the labour market. The national survey ABSOLVENT 2019 also serves this purpose, in which CTU regularly participates, as well as the international survey EUROGRADUATE organized by the Ministry of Education, Youth and Sports and focused on opinions and experience of university graduates, primarily in connection with transition to the labour market and related evaluation of the acquired education.

Employability of students is supported by the CTU Career Centre and the database of vacancies published on its website www.kariernicentrum.cz. The list is regularly updated list together with part-time jobs and internships that are suitable for CTU students. Another way to support employability of students is the Mentoring programme. Under the programme students

can acquire valuable experience in their field of study and start a future cooperation. Under the Mentoring programme, a close cooperation with CTU alumni has been established where the alumni take on the role of mentors for selected students.

Another way to support employability of students is employment consultancy sessions, where students can get information about the labour market from HR professionals working for technology companies.

In general it can be said that the level of employment of CTU graduates has been high as is confirmed by surveys made by individual faculties among employers who are satisfied primarily with the graduates' good level of technical knowledge. The Faculty of Information Technology regularly ranks very high in a ranking that compares how successful graduates are in the transition to practice. This information is regularly verified at graduates meetings as graduates usually work in the field that they have studied.

A university-wide project is implemented at CTU under the title Monitoring the Needs of the Labour Market, Cooperation with Practice, Strengthening Ties between CTU and Graduates, in which the majority of CTU constituent parts are involved. For example, a questionnaire is being developed at the Faculty of Civil Engineering for monitoring graduates on the labour market. The employability of graduates is also monitored outside the project - for example at the Faculty of Biomedical Engineering a questionnaire for graduates is used. The aim of the questionnaire survey is to obtain feedback from graduates especially in the following areas: evaluation of university studies (relation of study to practice and employment, evaluation of quality of education), changes in the study plan in terms of preparation for practice, level of satisfaction with studies, etc.

All constituent parts of CTU agree that systematic obtaining of feedback from employers is a weakness and that improvement is needed for future development.

COOPERATION WITH EMPLOYERS

CTU has a close link to highly specialized areas, where experts from practice often intensely cooperate with individual faculties. The majority of graduates are employed in the field in which they graduated, and their employability is generally very good. Already during their studies students and future employers have the opportunity to meet and get to know one another better at professional seminars or through involvement in concrete projects with the participation of both the academic sector and private sector.

Another possibility of a direct contact with job offers and concrete employers is through the CTU Career Centre (www.kariernicentrum.cz), which publishes a list of vacancies opening in firms for students and fresh graduates.

There is also the Mentoring programme mentioned above, under which professionals and managers at companies offer cooperation to selected students at CTU (mentoring.cvut.cz). In this way, students have the possibility to get acquainted with the company and the job of the particular mentor and establish contacts already during their studies.

Apart from that, the Career Centre also provides students with topics of bachelor, master and doctoral theses commissioned by firms. Consequently, students were also able to work on real projects as part of their theses and cooperate with professionals working for the given companies as their consultants.

We also invite HR specialist from technology firms to discuss future employment opportunities with students during regular consultancy sessions. In addition, we organized "career corners" in the framework of the iKariera fair (9 and 10 April 2019), during which students met HR specialists at companies participating in the fair.

We also need to mention the approach employed by the faculties, which primarily connect suggestions for bachelor and master theses of the academic and application sector, often accompanied by a job offer for a student/graduate. They also organize recruitment fairs, such as the "Catch Me at FNSPE" fair at the Faculty of Nuclear Sciences and Physical Engineering. Thanks to a close cooperation with ČEZ, students and graduates from this faculty are offered very specific and key position jobs (e.g. operators at nuclear power plants). The Career Days organized at the Faculty of Transportation Sciences also help to involve graduates in practice. In addition, the Faculty of Civil Engineering, for instance, is a partner of the project Koordinuj.cz, which organizes the so-called Arenas – professional meetings of selected companies and interested students. In 2019, the Arena – Construction meeting took place at FCE. So-called Technical Thursdays are another very successful activity concerning cooperation with employers. In 2019, they were held regularly every week and focused on current topics in the construction sector.

Partner programmes and various forms of contractual cooperation are gradually starting to prove a useful form of cooperation with future employers of our students. The Faculty of Information Technology has improved the way it cooperates with employers, offering the well-established FIT Partner and Sponsorship Programme (FIT Partner/FIT Sponsor), which gives companies and institutions an opportunity to influence the focus of students and in this way directly participate in the formation of graduates. Also the Faculty of Civil Engineering offers companies a contractual form of cooperation in three categories – Strategic Partner, Lead Partner and Partner. We should also mention the support of the Preciosa Foundation in the awarding of diploma theses at the Faculty of Mechanical Engineering.

5 Interest in studying

ENTRANCE EXAMINATIONS

Every year, entrance examinations at CTU are organized by individual faculties, which use their academic background to set up a system to test applicants' knowledge and for subsequent evaluation. A total of 10,870 applications to study were submitted in 2019 and there were a total of 9,834 applicants. While the number of applications was almost the same as in 2018, the number of applicants was higher by more than 1,000 in 2019. The total number of students admitted in 2019 was 4,917, i.e. 37 students more than in 2018. The Table Annex, Section 5 provides a more detailed picture using tables and graphs with the number of study applicants and the trends over time, along with other information about the number of graduates and so on. Entrance examinations to bachelor studies at most faculties at CTU aim to verify the knowledge of mathematics, when in a written test applicants demonstrates their ability to independently solve problems in the scope of high school mathematics. Each faculty and the Masaryk Institute of Advanced Studies prepare own tests that are compiled by faculty experts based on the faculty's needs to verify the abilities of future students in the given fields. The entrance examinations typically have only one round, with the exception of the Faculty of Architecture, where the entrance examinations consist of two rounds; an aptitude test in the 1st round (which tests the applicants skills by a visual arts test and a test in depth perception), while other skills are tested in a general knowledge test and a general study aptitude test.

The entrance examinations at the Faculty of Biomedical Engineering are very different and they contain a test in biology and physics for all bachelor study programmes, with the exception of the programme in Laboratory Diagnostics in Healthcare, which has a test in biology and chemistry.

Some faculties have own examinations in mathematics, which is an equivalent to the Maturita exam, the so-called Mathematics+ examination for the admission of students to selective study groups, which is successfully implemented in case of talented and motivated students, to whom special attention is then paid during their studies.

In the case of master studies, the entrance examinations differ as they are set by individual faculties with regard to their focus. In most cases they consist again of a test, the form of which is different for different faculties. For example, at the Faculty of Architecture, the admission procedure takes place in two rounds, where in the first round a student's portfolio is evaluated, followed by an interview.

COOPERATION WITH HIGH SCHOOLS

Events like One Day at FNSPE for groups of students and a teacher, Be a Woman Scientist for One Day, and Be a Reactor Physicist for One Day held twice a year, are just a small example of the events organized by the Faculty of Nuclear Sciences and Physical Engineering. The two-week Introduction to Computer Science programming course held in summer at the Faculty of Information Technology for about 100 students, led by professors and student lecturers from Stanford University is aimed to arouse the interest of high school students in programming in a fun way. Many more examples of cooperation with high schools could be mentioned here, including countless Open Doors Days and events for high school students, various specialized and educational seminars organized by faculties or, for example, by the CTU Klokner Institute, both on campus and at various high schools.

CTU strives to constantly develop and improve its cooperation with high schools and primary schools with regard to the development of digital technologies. During the holidays, for example, the IT Czechitas summer school took place at the Faculty of Information Technology. This event offered girls aged 14-19 the opportunity to learn the basics of IT technology and visit the faculty's laboratories. Three-day internships for high school students during which they participate in classes, the Hall of the Year JUNIOR competition, and the photographic

competition Through Your Own Eyes together with an excursion to specialized laboratories and the unique Josef Underground Educational Facility were offered by the Faculty of Civil Engineering.

In addition to the family, it is also the teachers who play an important role in the decisions taken by high school students. In 2019, we used different communication channels to inform the teachers about Open Doors Days, study programmes and fields of study, preparatory courses at individual faculties, about important application deadlines and more information about attractive topics in science, development, research and employability of CTU graduates. In addition, popular educational events in which CTU was involved or which it organizes, such as the Science Festival, the Night of Scientists or the CTU presentation at the National Technical Museum as part of the Prague Museum Night were presented at high schools and primary schools.

An integral part of cooperation with high schools is also the support of high school competitions and Olympics (in chemistry, mathematics, physics), Students' Professional Activities (SOČ), the Association for Youth, Science and Technology (AMAVET) and the Young Physicists' Tournament. These are some of the activities undertaken by the teachers at the Faculty of Nuclear Sciences and Physical Engineering. We can also mention here the possibility for high school students to participate in the 6th year of the FIKS competition – FIT's Informatics Correspondence Seminar, which helped them prepare to study at the Faculty of Information Technology. The best investigators could attend the final training course and some of them were admitted to FIT without taking entrance examinations. In 2019, the cooperation between several faculties resulted in the first year of the STRETECH (High School Technology) conference, which took place at the Faculty of Mechanical Engineering and the Faculty of Electrical Engineering.

In 2019, a number of contractual relationships were concluded, which resulted from a long-term cooperation with, for example, Arabská Gymnázium in Prague, which is one of the first high schools in the Czech Republic to offer a specialization in programming/informatics (one of the employees of the Faculty of Information Technology teaches at Arabská as an external teacher). Also the Faculty of Civil Engineering concluded an agreement on cooperation with two high schools – the Secondary Technical School of Civil Engineering on Dušní Street in Prague and the Josef Gočár's Secondary School of Civil Engineering in Prague. And in the second half of 2019, another agreement on cooperation was signed between the Faculty of Biomedical Engineering and the Grammar School in Roudnice nad Labem.

In addition to various contact events and activities, the Faculty of Transportation Sciences has compiled statistics on the number of students and how successful they are according to high schools from which they have come in the last ten years and will use these statistics to increase the focus of individual faculty activities on particular high schools.

Every year, CTU takes part in European fairs of post-secondary and lifelong education Gaudeamus. The fairs took place in January in Prague and in October in Brno. CTU's presentation at the fairs was in the form of an attractive exhibition, where, in addition to information about study opportunities, interesting projects were presented using interactive exhibits. Based on the feedback, we can say that the perception of CTU among high school students is very good, as evidenced by the fact that CTU won second place in 2019 in the competition for best exhibition at the fair in Prague and third place in Brno. At these fairs, we managed to actively communicate not only with potential students, but also with educational counsellors and teachers at high schools and establish deeper cooperation with them. Also, most CTU faculties presented themselves at the Gaudeamus – Akadémia fair in Bratislava.

Also in 2019, a correspondence competition on the borderline between mathematics, informatics, physics and logical thinking called the Lions' Den was held. The 10th edition again fulfilled the aim to inform about studies at technical universities in the form of a fun and exciting path to knowledge. A summer holiday camp called Lions' Den (www.jamalvova.cz) was held for the best participants.


6

Ing. Jiří Boháček / Registrar

"Talented people and sufficient financing are fundamental for a sound operation of any university. Due to the state of the public sources of financing we have to primarily focus on efficient management, savings and searching for new ways to develop. The team that is behind the everyday activities securing the operation of CTU is not seen nor heard of very much, and this is exactly why I would like to extend my thanks to them."

6 Employees

HR AWARD

In 2019, CTU received the HR AWARD, which was a major milestone in the development of human resources. Already in 2017, the university subscribed to the principles enshrined in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. In 2018, an internal GAP analysis was conducted within which a questionnaire survey among employees was carried out. Based on the results of the analysis, CTU has prepared an action plan (AP) with the help of which it will gradually implement measures aimed at fulfilling the principles of HRS4R (Human Resources Strategy for Researchers). On 10 September 2019, CTU in Prague received the prestigious HR Excellence in Research Award from the European Commission, and a two-year implementation period is currently underway. The HR Award is given by the European Commission to research institutions whose HR strategies are based on the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. In these documents, the European Commission obliges research institutions to create working conditions, ensure professional development and transparent procedures for the recruitment of researchers.

CAREER SYSTEM AND MOTIVATION TOOLS FOR ACADEMIC STAFF

The clearly defined principles stipulated in the CTU Code of Ethics are respected across the university, and despite the differences between individual constituent parts of CTU, are strongly reflected in HR management. Full responsibility in this area lies with each faculty or university institute. By accepting the above award, CTU as a whole has committed itself to meeting the goals represented by this award. The debate about the adoption of a career system that is already being developed and is included in the ongoing approval processes has been going on for a long time and it must include and respect the individual conditions stipulated by the university. The main points of the document under preparation include primarily a focus on international experience on all researcher posts and support for publishing activities. At the same time, it is also necessary to establish clear responsibilities for all jobs. An integral part of the debate is the need to support young researchers in general and primarily when on parental leave. The HR Award has committed CTU to adopting a career system for academic staff within two years, after the debate on this topic has been closed.

DEVELOPMENT OF PEDAGOGICAL SKILLS OF CTU ACADEMIC STAFF

Pedagogical skills are an inseparable part of the development of the university as a whole. Currently, support is given mainly to young and starting teachers, who need to acquire basic knowledge, pillars and practices for the transfer of knowledge to students. The Masaryk Institute of Advanced Studies is the main provider of courses and other services for all constituent parts of CTU. Some faculties recommend to their employees that they should take a one-semester course in pedagogy and psychology as a minimum requirement. The development of academic staff also includes the opportunity to participate in courses in academic writing and publishing organized by the National Library of Technology (NTK). Most faculties have set up communication channels between guarantors of subjects and teachers, who can make use of and acquire experience in the form of consultations and discussions on teaching methodology.

The university-wide evaluation by students is immensely beneficial as a source of feedback from students to teachers. This tool is made available through the CTU survey web system and is also appreciated by teachers as it gives them an opportunity to adjust their teaching methods and approach to meet the objectives of the course as well as students' expectations.

Also presentation skills are an integral part of the development of pedagogical skills. Academic staff at CTU have the opportunity to present their projects and themselves at a number of conferences organized and co-organized by CTU. CTU also helps experienced teachers and pedagogues develop presentation skills and the ability to communicate with other members of the academic community, students or the professional community.

It should be noted that the majority of academic, scientific and other staff at CTU are between 29 and 49 years of age. Over 50% of employees are 50 or younger. In 2019, the total number of employees increased slightly by about 2% compared to 2018; the age structure was maintained. Nevertheless, also older academic staff have access to development programmes as part of lifelong education.

All information on the structure of academic, scientific and other staff, including the share of individual constituent parts and other details (including graphs) is given **in the Table Annex, Section 6**.

PLAN OF GENDER EQUALITY AND SEXUAL AND GENDER-BASED HARASSEMENT

CTU is a technical university where there are still more men than women. The number of women among staff and students is increasing thanks to the intensive activity of individual faculties and the positive presentation of women who have succeeded in these disciplines. Compared to 2018, the total number of women increased by 56, which represents 3% of the total number of 5,513 employees. This is a long-term trend that can be seen across all groups of employees. There was an increase in academic, scientific and other staff. In the long-term, the same development can be seen in academic and research staff with foreign citizenship.

The principles of CTU are based on personal freedom, equality and mutual respect. All constituent parts of CTU clearly agree on these rules, without the need to regulate them from above. CTU is aware of issues related to sexual and gender-based harassment and stays vigilant. No one can abuse the obligations arising from employment relationships to the detriment of another employee, seek to reduce human dignity of others or harm them in any way.

The methodology not only for gender equality is set up the CTU Rectorate, where an employee specifically trained in this area is employed. Discrimination on the grounds of sex or age would be investigated directly by senior staff at any given constituent part and if necessary also in cooperation with police.

Prof. Ing. Oldřich Starý, CSc. / Vice-Rector for International Relations

"CTU is a great university at the heart of Europe and my wish is that it should be involved in European projects and closely cooperate with excellent international teams to respond to social challenges. I will use my abilities and tools given to me to strengthen the position of CTU in international, or even world-wide context."

7 Internationalization

Internationalization is a goal which, if met, has a positive impact on education and science, which constitute the main mission of the university. Internationalization positively affects behaviour and level of knowledge of students and academic staff as well as CTU in Prague's position towards partners in the Czech Republic and abroad.

CTU considers participation of its students and teachers in international mobility programmes an important part of studies and supports it at all levels. This stems from the CTU Long-Term Plan and from what CTU stands for as an institution. A wide range of programmes listed below are used to support mobility, which in 2019 totalled CZK 207,620,000. A total of 230 students and 1,501 academic and research workers were sent abroad. It is clear that CTU is an attractive university for foreign students as in 2019 it welcomed 763 of them, of which 299 arrived under the Horizon 2020 community programme. Collected and evaluated data on internationalization and mobility on the part of CTU are shown **in the Table Annex, Section 7**.

MOBILITY PROGRAMMES

Support to students' participation in international mobility programmes

Support to students stems from the CTU Long-Term Plan's priority – "Financial Support for Long-term Student Stays Abroad and is reflected in several ways, primarily through the Erasmus+ programme, the university IP project "Student Mobility" and several other minor projects also focused on student mobility. Students' participation in mobility programmes is mainly based on the need to provide them with experience from studying abroad rather than on a formal agreement of all subjects.

Erasmus+ programme

The Erasmus+ programme was a major international cooperation programme and support tool for mobility in 2019. This EU programme allows the participating institutions to organize student exchange based on bilateral agreements between the institutions at bachelor, master and doctoral level. Students can study or do an internship abroad, academic staff can make visits and teach abroad, and non-academic staff can improve their knowledge in their respective fields abroad, shadow a counterpart, or participate in specialized workshops organized by partner institutions and more.

In the 2019–2020 academic year, CTU in Prague concluded a total of 632 bilateral agreements with 318 foreign universities in 30 countries under the Erasmus+ programme, with the overall capacity of 1,396 outgoing and 1,395 incoming students.

In the 2019–2020 academic year, a total of 598 applications were submitted. Based on the applications and a subsequent selection procedure, a total of 340 students were nominated to study abroad.

Under the programme, 441 CTU students studied at partner universities in Europe in 2019, primarily in Spain (25), Germany and Finland (22), the UK (23) and Sweden (19). In 2019, the majority of outgoing students were from the Faculty of Civil Engineering (50), the Faculty of Electrical Engineering (50) and the Faculty of Architecture (48).

A total of 26 CTU academic workers visited partner institutions to teach there, primarily in Germany, France and Bulgaria. Sixteen academic and administrative workers at CTU participated in training sessions at partner universities, primarily in Spain, Croatia, and Italy.

In the 2019–2020 academic year, CTU used up all the allocated EU funds: student mobility €4405,000, staff mobility €15,265, organization of mobility €66,800. In the 2019–2020 academic year, the co-financing received from the state budget, in particular the international cooperation contribution, totalled €275,740. In total, student grants and staff mobility grants amounted to €762,805.

In 2019, a total of 657 incoming students studied at CTU under the Erasmus+ programme coming in the 2018–2019 and 2019–2020 academic years. The largest numbers came

from France (201), Spain (104) and Germany (72). The majority of incoming students were registered at the Faculty of Civil Engineering (160), the Faculty of Electrical Engineering (126), the Faculty of Mechanical Engineering (123), the Faculty of Architecture (89) and the Faculty of Information Technology (71).

"Student Mobility" IP project

This annual project is the continuation of a time-proven model of sending students to partner universities abroad based on bilateral agreements on student exchange, primarily outside Europe. The project consists in selecting students including language tests for one- or two-semester stays at universities abroad, granting of scholarships, organization of their stay and final evaluation of acquired study results. The project is intended for students of all faculties including those studying for a double degree.

In 2019, a total of 203 outgoing students studied under the project for a total of 879,5 student-months and a total of 371 incoming students studied at CTU for a total of 1,472 student-months.

The outgoing students are mostly interested in studying in the USA (9 universities, 44 students), Taiwan (8 universities, 34 students) and South Korea (8 universities, 16 students). Other counties included Singapore (20), Japan (8), Australia (12), New Zealand (5), Mexico (5), Hong Kong (9), Canada (8), Costa Rica (1) and Chile (1). Students also went to study in Argentina (8), Peru (3), Russia (2), China (6), Thailand (2), Brazil (1), Izrael (1) and South Africa (1).

A total of 17 students went to study for a double degree at partner universities in Germany, France, Indonesia and Russia.

As mutual bilateral relations are always based on reciprocity, most incoming students also come from the USA (59), South Korea (55) and Taiwan (46). Many incoming students (outnumbering outgoing students) also come from China (35), Mexico (40), Canada (27), Russia (22), Singapore (20) and India (13). Students also came from Australia (11), Argentina (6), Chile (6), Brazil (5), Peru (5) and New Zealand (5).

It must be underlined that all received funds (totalling CZK 11,000,000 in 2019) are always fully used exclusively for scholarships for outgoing students and are never used for salaries, bonuses for the implementation team, material items or any other related services. This is a university project, coordinated by the Department of International Affairs at the CTU Rectorate; nevertheless, the benefits (students' scholarships) are transferred to students of the involved faculties.

ATHENS programme

As every year, CTU in cooperation with UCT was actively involved in the ATHENS programme. Two sessions of week-long exchange programmes were again organized, in March and in November 2019, at universities abroad. In March, 151 students (118 CTU + 33 UCT) travelled abroad to participate in 38 courses (Italy 8 courses, Spain 8, France 5, Belgium 4, Portugal 3, the Netherlands 2, Norway 2, Germany 2, Romania 2, Turkey 1, Greece 1). A total of 132 students participated in the November session (116 CTU + 16 UCT) and participated in 41 one-week courses (France 11 courses, Spain 11, Italy 5, Portugal 3, Belgium 2, Germany 2, the Netherlands 2, Hungary 2, Poland 1, Austria 1, Turkey 1). Compared to previous years, the number of outgoing students increased significantly for both dates.

Further support of student mobility

CTU also supports short-term stays of students, including doctoral students, abroad, primarily in order to participate in selected international scientific conferences. This is conditioned on an active participation in the given event and by other activities of the outgoing students on behalf of CTU, primarily preparation of new projects or future bilateral contractual cooperation, presentation of the university, etc.

In 2019, a total of 192 students, participants in a number of international sport games and specialized competitions were supported by a total of CZK 944,000.

FOREIGN ACADEMIC STAFF IN THE LIFE AT CTU

Deepening of the internationalization of the life at the university and the enhancement of the quality of the educational process is also affected by the presence of foreign academic workers at the individual faculties. Based on the existing agreements on cooperation with partner institutions abroad and based on the requirements of individual faculties, the university reaches out to foreign colleagues and invites them to teaching stays as part of standard classes at CTU for bachelor, master and doctoral study programmes. The funding for these teaching stays is provided by the "Staff Mobility" IP project, which has been for over five years now a standard part of the activities aimed at further deepening of the internationalization of the life at CTU. The project stems from a CTU Long-Term Plan priority – "Enhancing the Number of Foreign Teachers" and its main part focuses on the organization of the arrival of foreign teachers, their stay at CTU and covering reasonable costs of stay.

The said project represents a beginning of a permanent involvement of foreign teachers in teaching of selected fields of study as part of the educational process at CTU. The involvement of foreign experts will enhance the attractiveness of CTU and may result in an increased interest on the part of self-funding students at individual faculties, which in turn will bring additional financial resources.

INTERNATIONALIZATION OF ACADEMIC LIFE AT CTU

All activities in the field of internationalization stem from the priorities of the Long-term Plan of Educational and Scientific, Research, Development and Innovation, Artistic and Other Creative Activities for the period 2016–2020 and its update for 2019. The fulfilment of individual tasks is summarized in the following overview.

The network of international partners with whom CTU has concluded bilateral cooperation agreements is expanding. CTU cooperates with 110 universities from the top 500 universities according to QS World University Rankings 2019. Contracts on cooperation in science and research have been concluded

with 59 universities from this prestigious list. In 2019, new agreements on cooperation were concluded with the following universities (sorted alphabetically by country):

- University of Antwerp, Antwerp, Belgium
- Zhejiang University, Hangzhou, China
- Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
- Yokohama National University, Yokohama, Japan
- KEPCO International Nuclear Graduate School, Ulsan, South Korea
- Universidad tecnológica de Panamá, Panamá, Panama
- Kazan Federal University, Kazan, Russia
- Ural Federal University, Yekaterinburg, Russia
- Samara State Technical University – Samara Polytech, Samara, Russia
- University of Seoul, Seoul, South Korea
- Chung Hua University, Hsinchu, Taiwan
- National Taiwan University, Taipei, Taiwan
- University of Central Florida, Orlando, USA
- University of Vermont, Burlington, USA

The number of foreign students at individual CTU faculties increased from 3,725 in 2018 to 3,825 in 2019, which represents a year-on-year increase of 2.7% and a 20.13% share in the total number of CTU students. In 2019, students from 110 countries on all continents studied at CTU.

CTU, as an active member of the association of prestigious universities T.I.M.E., signed the International Doctorate Charter already in 2012, under which joint doctoral study programmes are prepared, primarily between the member institutions of this association. Joint study programmes have already been prepared with TU München (FCE), École Centrale de Nantes (FCE), KTH-Royal Institute of Technology (FCE), RWTH Aachen (FCE, FEE and FBME), Aalto University (FEE) and TPU Tomsk (FEE).

In 2019, a total of 621 self-funding students studied at CTU. Also in 2019, further steps were taken to gradually increase the number of these students, especially in the form of updates to the information and promotional materials, including a newly designed website informing on the possibilities and conditions of study at CTU. In 2019, the Study in Prague project organized working trips of Rectorate and faculty representatives to recruitment training fairs in China, Korea, three countries in Latin America, Russia, Ukraine, South Africa, Turkey, Germany, the Netherlands and Belgium with the aim to promote studies at CTU and to acquire new self-funding students. Regular participation of CTU representatives in the three largest trade fairs for international education – NAFSA in the USA, APAIE in Asia and EAIE in Europe – contributes to the deepening of existing interuniversity cooperation and the establishment of new contacts.

CTU's participation in a number of projects, following on from projects under the now closed Erasmus Mundus programme and aimed at supporting student mobility from so-called third countries to EU member states, also positively impacts on the number of foreign self-funding students. CTU was active in projects in which also Latin American, Indian and Brazilian universities participated. It should be noted here that CTU has committed itself to continuing to cooperate with partner universities that formed the consortium of the now closed HERITAGE project (EU and India) and also within the consortium of another SmartCities-SmartGrids project (EU and Brazil).

The most important part of international cooperation is the long-term exchange of students with partner universities under the Erasmus+ programme and on the basis of bilateral agreements. The number of outgoing and incoming students under these two activities represents more than 85% of all mobilities at CTU. The overall interest in these stays is constantly increasing; however, the increase in their number depends on the amount of available funds. In the last three years, the possibility of using funds from the Ministry of Education, Youth and Sports from the Programme to Support International Cooperation (Indicator D) has had a positive effect on financing of mobility outside Europe.

Also in 2019, two Orientation Week events for incoming foreign exchange students were organized by members of the International Student Club with the organizational and financial support of the International Office at the CTU Rector's Office. Two similar events took place thanks to the Study at CTU project for self-funding students from abroad. The Orientation Week is an important and well established tool through which CTU can help new students coming to CTU from abroad.

In cooperation with the International Student Club, foreign students were offered two dozen language courses and several dozens cultural, social and sightseeing events in their free time. They have the opportunity to participate in at least one student event per week, which significantly contributes to the perception of the CTU campus in Dejvice as a pleasant place for study and free-time activities. Also thanks to these activities, Prague has long been on the list of the world's cities that are friendly to foreign students.

Study in Prague project

In 2014, a joint project of five public universities in Prague (Charles University, CTU, the University of Economics Prague, UCT and the University of Life Sciences) a project called Study in Prague was initiated and prepared under the leadership of CTU. The project's aim is to promote study at these universities and attract self-funding students from perspective destinations. The project continued also in 2019, when the Academy of Arts, Architecture and Design in Prague and the Academy of Performing Arts in Prague joined the consortium. The aim was primarily to enhance the participating universities' efficiency in promotion and funding. In 2019, a joined website of the project was launched, including the project's registered logo and a graphic standards manual. All relevant information for people potentially interested in studying one of the fields of study on offer (over 300 fields of study in total) is available on the website. One of the advantages is that the website also includes study programmes in English using primary sources, i.e. taken directly from the study portals of the participating institutions. Economic benefits were felt at study fairs where the Study in Prague consortium shared one stall. Consequently, the costs of one such presentation per university were considerably lower

compared to individual presentation. In addition to the above mentioned fairs, the Study in Prague initiative was present also at the NASFA 2019 international conference in Washington D.C. and at the EAIE conference in Helsinki. The project funds were used to pay for unified informational and promotional materials and a promotional video. The information about the study programmes of individual universities and the promotional flyers were in English, Portuguese and Chinese. An inseparable part of the project is also promotion on social media and online marketing activities. The project is presented at the Masterstudies portal and on the website of QS, the renowned organization responsible for the QS World Universities Ranking. The project has resulted in a steady increase in the number of self-funding students (a total of 621 in the 2019/2020 winter semester) and a growing awareness of the possibilities to study at public universities in Prague, as evidenced by an extensive international research survey conducted among people interested in study in Prague. Prague is the 35th best student city worldwide. This great ranking is a result of multiple factors, primarily the fact that a lot of the study programmes are in English, the high level of services provided to foreign students, relatively low cost of living, popularity of Prague and last but not least, the overall safety, which has not been necessarily true for other cities in Europe in the last four years.

In 2019, internationalization was also boosted by the changes in the 2019 Study and Examination Rules, which stipulates that it is obligatory for students in doctoral study programmes to spend at least one month at a university abroad or participate in international cooperation in another manner, primarily by participating in an international creative project whose results are published or presented abroad.

MAJOR INVOLVEMENT IN INTERNATIONAL CONSORTIA AND PROJECTS (ACTIVITIES BOOSTING INTERNATIONALIZATION)

CTU is a leading technical university. Thanks to the specialization of individual faculties and university institutes, intensive international cooperation takes place in the form of international scientific projects. The prestige of CTU is also evidenced by its membership in various international associations and unions. For instance, we can mention the institutional membership of the Faculty of Architecture in the European Association of Architectural Education (EAAE), the Association of European Schools of Planning (AESOP) and for the last three years also DOCOMOMO International (International Committee for Documentation and Conservation of Buildings, Sites and Neighbourhoods of the Modern Movement). Also important is the involvement of CTU in international standardization (CEN and ISO) and in international research focused on materials engineering and structural reliability (RILEM, IABSE, fib, WTA, JCSS). Last but not least, internationalization is also boosted by international conferences organized or co-organized by CTU, in which our leading experts participate.

Prof. Ing. Zbyněk Škvor / Vice-Rector for Science, Creative Activities and PhD Studies

"Based on the latest results of specialized evaluation of publications, CTU scored better than average in the Czech Republic in all disciplines that are cultivated at CTU, and sometimes it was a bit of a surprise. We form just a tiny bit of international science, and so I am very happy that the involvement of our staff in international cooperation with excellent workplaces has become a norm. Also companies are increasingly more interested in cooperation. CTU sometimes participates in the development of final products for the market; however, more often than not its role is to come up with brand new ideas and, after the biggest problems have been solved, leave the final commercialization to commercial companies. This model has been tried and tested internationally. I am especially proud of the fact that the majority of university departments have talented and enthusiastic young researchers."

8 Research, development, artistic and other creative activities

MEASURES TO BOOST THE CONNECTION BETWEEN CREATIVE AND EDUCATIONAL ACTIVITIES

"CTU in Prague will strengthen its position as a leading technical university in the Czech Republic, and its position as a globally recognized research university that develops the talent and competences of its students, academic and other workers." The first sentence of the CTU vision clearly states that research, development, artistic and other creative activities are fundamental at all faculties and university institutes of CTU and are instrumental for research at CTU. Mutual cooperation and its results constitute the results achieved by the university as a whole, which has a clear impact on educational activities. The interconnection between scientific and educational activities takes place mainly at the level of doctoral studies; however, it also happens in master and bachelor study programmes. Students are regularly involved in research at CTU and the vast majority of programmes include in their curriculum subjects that stem from the given teacher's creative activities and their focus. The professional development of scientists at CTU is related to the improvement of the education of students, including doctoral students, and also to the professional development of supervisors and the entire scientific and pedagogical staff. PhD students are involved in prestigious and successful teams solving various projects and are financially motivated (in the form of part-time employment in scientific projects, or in the form of special-purpose scholarships) and they also have more possibilities to go abroad as part of scientific cooperation, etc. For a more in-depth analysis, see data shown **in the Table Annex, Section 8** on research, development, artistic and other creative activities.

Significant support is provided to research of doctoral students through the Student Grant Competition (SGC), which creates conditions for the implementation of theoretical and experimental research in the form of targeted support of specific research. SGC takes place once a year, and it covers two areas. The first area is the support of grant projects in the field of architecture and urbanism, architecture and construction, civil engineering, geodesy and cartography, mechanical engineering, engineering and technology in transport and communications, logistics, informatics, electrical engineering and informatics, engineering informatics, application of natural sciences, biomedical and clinical technology, economic and management disciplines, quantitative methods in economics and history of technology. The second area is the support of projects aimed at organizing student scientific conferences.

In 2019, CTU became a collective member of the Association of University Workers (APUA), a professional independent and non-political association of experts who work at Czech universities. In this way, employees' professional and expert knowledge will be supported by their participation in seminars, workshops and working meetings (http://apua.cz/).

At the same time, it should be noted that in 2019, CTU organized or co-organized 63 international conferences, which is more than five international conferences per calendar month, and another 57 conferences attended by over 60 participants. This clearly shows that the expertise and activity of the members of the academic staff are high and in demand by the professional community. Active participation in conferences is also one of the motivational elements used by individual faculties for doctoral students.

The learning by doing method has been used for several years at the Faculty of Architecture, and several studios where students of all three levels of programmes, i.e. from bachelor to doctoral, work have been using it. In 2019, this method was used in the Studio Seho for the construction of the Rolling House by the renowned sculptor of Czech origin John Hejduk. The Rolling House is now located on the piazzetta in front of the faculty's building. Another example of the connection between creative and educational activities are announced competitions, such as the Digital Factory. This competition for a work of art created by 3D printing technology from recycled materials was organized in May 2019 as cooperation between the Ministry of Industry and Trade together with the Faculty of Architecture CTU and

PET-MAT z.ú. The winner was Ekin Ünlü, a student at the Faculty of Architecture from Turkey, who studied at the faculty under the Erasmus exchange programme. Her statue Kaleidoscope was auctioned at the International Engineering Fair in Brno 2019 with deputy prime minister Karel Havlíček in attendance. The Faculty of Architecture also organized creative workshops, both regular ones, such as the summer school of construction, and one-off events, which in 2019 included the Lego Architecture Workshop & Inspirelli Awards and the workshop of prof. Mirko Baum from RWTH Aachen as a follow-up to his twelve-part lecture series on the topic of structural logic in architecture.

INVOLVEMENT OF STUDENTS OF BACHELOR AND MASTER STUDY PROGRAMMES IN CREATIVE ACTIVITIES AT CTU

Due to their specific nature, individual faculties and constituent parts of CTU have a very different possibilities and approach to the involvement of students in bachelor, master, or follow-up master study programmes. The range is broad and widely used, with very good feedback from students and external partners. Students actively use creative results and information in their course papers and bachelor, diploma and dissertation theses. The topics of qualification theses are coordinated with regard to current issues that occur in the given field and in this way they always reflect major issues and problems of the time, solved within the research and development activities of academic staff of individual faculties. Students as members of research teams at the different faculties participate in solving partial tasks in projects of the Student Grant Competition, security research, GA ČR, TA ČR and other international projects.

With respect to connecting educational activities and scientific research, the Faculty of Civil Engineering is involved research activities of the University Centre for Energy Efficient Buildings (UCEEB). Thanks to this cooperation, academic staff and doctoral students are involved in joint research projects, using cutting edge scientific experimental facilities at UCEEB. Connecting creative and educational activities is also reflected in including newly acquired knowledge in lectures and practical training. Participation of students in research activities at individual departments and workplaces is also supported by the system of student scientific staff and direct involvement of students in bachelor and master study programmes in research projects. Students have an opportunity to participate in competitions organized by individual departments (Rektorys's, Bažant's, Vyčichlo's competition) and in a SVOČ competition in various disciplines, where they can compete with students from all over the Czech Republic. Our faculty has historically always scored very well in this competition.

As part of the implementation of scientific research projects, conditions are created, including relevantly and well-equipped laboratories, which students use in their projects. These activities would not be manageable without active participation of the majority of doctoral students and some master and bachelor students. As part of compulsory student projects, internships in industry were supported based on long-term good experience with the international programme Master of Automotive Engineering, when an entire semester is devoted to a project in industry or research focused on the preparation of diploma theses. On the other hand, industrial partners participated in block teaching of practically oriented subjects (usually construction), followed by practical projects. At the Faculty of Mechanical Engineering, a Student Creative Activities (STČ) conference took place in April 2019, where students in bachelor, master and doctoral study programmes presented the results of their work achieved during the academic year in various categories and sections. One of the major student and technical projects at FME is the participation of the CTU CarTech team in student formulas (SAE), within which technical solutions are presented at international competitions. Similarly, eForce FEE Prague Formula, a team of students from the Faculty of Electrical Engineering participated in the international Formula Student competition. At the same time, already in the 2nd semester of their studies, the best students at the Faculty of Mechanical Engineering can participate in the projects announced and supported by individual institutes, which aim to involve those interested in scientific research activities implemented at individual institutes. A separate portal is created on the faculty's website, where these topics are listed and which facilitates orientation in the proposed project topics.

At the Faculty of Architecture, in addition to the application of the above mentioned learning by doing method, which primarily strengthens the connection between creative and educational activities, some bachelor and master theses are commissioned as alternative designs of existing public buildings, whose design was originally created in teachers' studios. Students welcome this approach as they can see real results, which increases their overall motivation.

Other faculties, such as the Faculty of Electrical Engineering or the Faculty of Nuclear Sciences and Physical Engineering, provide top education in their programmes, which are closely linked to research activities. Semester projects and qualification theses are usually part of a research or development project in which students and academic staff are involved. Students work on research also in the framework of projects of the Student Grant Competition and their involvement is also instrumental in solving projects of the Grant Agency of the Czech Republic or the Operational Programme Research, Development and Education, etc. At the same time, topics of theses at these and other faculties are formulated to address current issues in the given fields and in this way they reflect the issues solved as part of research and development activities of academic staff. Students participated in commissioned research projects, measurements, testing and expert consultations, primarily for health care institutions and for companies producing and distributing medical equipment.

The Faculty of Transportation Sciences implements project-oriented instruction, in which external experts from the field of road, rail and air transport and IT-telecoms sector are involved. Individual departments have been collaborating with partners from the application sector to solve both research and practical tasks. Students in doctoral study programmes are involved in specific research mainly through projects in the Student Grant Competition. Talented students are involved in expert and

scientific research activities as student research assistants, or through their involvement in projects, grants and experiments. Project-oriented instruction means that in the framework of student projects, cooperation is established with a range of employers – e.g. PUDIS a.s., Správa železnic and some state organizations, such as the coordinator of public transport in the Liberece Region KORID LK, spo. s r. o., ROPID, the Prague Institute of Planning and Development. A team of students in bachelor study programmes regularly attends the Middle European Planning Seminar (MEPS), which is held alternately in the Czech Republic, Austria and Hungary. The seminar takes one week, during which students in international teams solve selected transport-engineering problems of the host city – in 2019, the seminar took place in Sankt Veit an der Glan, Austria. Three academic workers and 12 students at FTS were involved in the organization of the seminar. Since 2001, the faculty has been participating regularly in another international student workshop, the International Workshop City & Traffic (C&T), which focuses on designing transport infrastructure in cities, traffic calming and organization and regulation of traffic. Nine universities take part in the seminar; in July 2019 the seminar took place in Krakow, Poland; one academic worker and four students came to represent the faculty.

Students also acquire the latest results and experience from research, development and other creative areas of biomedical engineering and health care disciplines from academic workers employed at FBME and from outside experts from practice who are involved in teaching at the Faculty of Biomedical Engineering. They also helped organize a number of social and cultural events (e.g. the Week of Science and Technology, Gaudeamus, Science Festival, Student Iron Fireman, Open Door Days, Majáles in Kladno, the Day with Integrated Rescue System, Peace Run Kladno-Lidice). They also participated in various competitions and had presentations at scientific conferences for students. On 15 May 2019, the fifth annual Jan Lewinský Memorial – 2019 Student Iron Fireman FBME CTU was held. By participating in this event, high school and university students commemorated Jan Lewinský, student in the study programme in Population Protection, who died while on duty as a member of the Fire Rescue Service of the Czech Republic.

At the Faculty of Information Technology, in addition to the above mentioned grants and scientific conferences, students have a possibility to work in applied research in research laboratories or as members of research groups. At the same time, in the summer they can take part in the Research Summer (VýLet) event, where they work together with their mentors on joint projects after which a research paper may be written. A very important tool is the faculty's Cooperation with Industry portal, which allows students to get involved in solving problems assigned by partners from practice, as part of non-educational activities or as part of some subjects in the form of student projects.

CTU university institutes, such as the Klokner Institute, directly involve investigators of research projects in instruction and also allow students in bachelor, master and doctoral study programmes to participate in them. They are not only students from the Czech Technical University, but also from other Czech universities, as is the case, for example, at the Institute of Experimental and Applied Physics. In 2019, its staff, including students who conduct the expert part of their studies at IEAP, participated in solving advanced projects in cooperation with CERN (ATLAS, MOEDAL, LUCID, Medipix), projects in neutrino physics (SuperNEMO and TGV experiments in the LSM underground laboratory in France, the Baikal-GVD experiment in Russia, the LEGEND experiment) and the detection of neutralino - a possible carrier of dark matter in space (the PICO experiment in the SNOLAB underground laboratory in Canada), nuclear physics projects (monitoring of exotic nuclei in cooperation with ILL Grenoble and JINR Dubna) and space research (cooperation with ESA and NASA – pixel detectors on the PROBA-V satellite and on ISS, cooperation with the Japanese Aerospace Exploration Agency JAXA – pixel detectors on the RISESAT satellite, the GROND experiment).

Another major event is the student scientific conference named after Albín Bráf, organized by the Masaryk Institute of Advanced Studies, whose fourth edition took place on 29 May 2019. Many students at the Masaryk Institute of Advanced Studies are involved in the project of the Technology Agency of the Czech Republic entitled Integration of Children from Children Homes in Society and Their Adaptation on the Labour Market. The project started in 2018 and will continue until 2022.

In 2019, the specific financial resources received by CTU from the state budget in support of research, development and innovation totalled CZK 1,735,762,048, of which CTU spent CZK 1,457,552,806 directly on grants and projects. The rest was paid out to partners and suppliers in accordance with conditions of solved projects and relevant contracts. The share of projects implemented directly at CTU was 84%, the rest of the funds were received by other entities in the projects. This share indicates that CTU is able to implement a number of projects independently and at the same time it is an organization that is open to cooperation with other expert teams.

SUPPORT FOR STUDENTS OF DOCTORAL STUDY PROGRAMMES PROVIDED BY CTU

The primary fundamental way in which to support doctoral students at CTU is to offer them high-quality dissertation topics provided by supervisors who are not only experts in the given field, but are also willing and able to lead their doctoral students on the path of science, including their first published aricles in high-quality journals.

In 2019, the working environment at CTU improved mainly thanks to the bestowal of the HR Excellence in Research Award from the European Commission, which adopts the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. As part of the implementation phase, internal regulations and processes are being prepared that will take into account and support junior researchers and postdoc students, such as the Strategy for International Cooperation in the Field of Research and Development and the CTU Career System.

As mentioned in the chapter on students-parents, they can take their children to educational institutions – a kindergarten

and school, where children have the opportunity to visit specialized workplaces at CTU and where specialists from individual faculties and students participate in teaching.

CTU also seeks to support internationalization in the field of science, for instacce, it supports application of individual grants such as the ERC or Marie Skłodowska-Curie Actions of the European Commission and other mobility programmes. The direction of cooperation, especially the selection of foreign partners and the method of its implementation, usually evolves organically from the activities and specific needs of individual workplaces and emloyees and from their professional interests. Taking into account also the size and heterogeneity of CTU, support is planned in the future by especially strengthening strategic areas corresponding to major projects from structural funds under preparation at the central or faculty level (Centre for Industrial Technologies, Innovations Centre for Transport Technologies, Aerospace Technologies in the Czech Republic, Light Technologies for 21st Century Energetics – LIGHTEN, UCEEB 20+, Research Centre for Artificial Intelligence and Machine Learning – AIML). CTU's participation in the EU's European Universities Initiative network is also crucial.

For doctoral students' study stays abroad, special-purpose support programmes from external sources are primarily used – the ERASMUS+ programme, EU operational programmes, to support international cooperation and the Czech Republic's participation in international organizations, grant projects, incl. Student Grant Competition, which is widely used by all faculties and institutes. At the same time, CTU supports the establishment and development of joint doctoral study programmes with foreign universities in the form of so-called double or joint degree PhD programmes with international institutions with a similar focus.

In 2019, also university information infrastructure was supported, for instance, the Anlupa.cz app, in order to ensure timely and sufficient information on the possibilities of financing of national and international projects. In its plans for digital development, CTU supports the Open Access principle of publishing preprints, for example, by using the D-Space university repository or specialized repositories within arXiv.org.

It must also be noted that individual faculties seek to create conditions for promising young teaching and scientific staff (postdocs). This includes their involvement as researchers in research projects under various national and international programmes, including the use of the aforementioned Student Grant Competition and mobility programmes. Other tools are also used to improve the conditions for postdoc employees; for instance, the Faculty of Civil Engineering has established an Initiation Fund with the aim of supporting and stabilizing the situation of promising young researchers (within ten years after obtaining the Ph.D. degree) and supporting their activity in pursuing international projects and establishing international cooperation. Doctoral students are members of research teams and participate in the solution of domestic and foreign projects of basic and applied research and contractual research. Their scientific-research work is also supported by grants in the framework of the Student Grant Competition financed from funds intended for specific research or by involvement in contractual research in cooperation with industrial partners, as was the case last year at the Faculty of Mechanical Engineering. FME also uses donations, for example from the Zvoníček Foundation.

The dean of the Faculty of Electrical Engineering grants one-time special-purpose scholarships for exceptional results of creative or pedagogical activities or for the support of the study of foreigners in the Czech Republic. The Faculty of Information Technology introduced the possibility of granting direct financial support to doctoral students in full-time form of study. The Faculty of Electrical Engineering also closely cooperates with the institutes of the Czech Academy of Sciences, with which FEL has accredited fields of study for the education of doctoral students, as well as with some other workplaces (for example with medical faculties and university hospitals), where doctoral students conduct experimental work. The boost in relations with the state administration and the industrial sector was also significant, and it was felt across all constituent parts of CTU.

Students in doctoral programmes and postdoc employees at the Faculty of Nuclear Sciences and Physical Engineering and the Faculty of Biomedical Engineering are encouraged to actively participate in scientific conferences, to publish articles and to participate in scientific grants. A stronger presence at conferences is caused mainly by the specialization of these faculties. In this way, participants develop their communication and presentation skills.

For many faculties, cooperation with leading employers in the respective industries plays an important role. For example, the Faculty of Civil Engineering ensures the development of its doctoral students by building relationships with major employers in the field of transport, but also top research institutes, universities and companies abroad. Representatives of companies actively participate in suggesting topics of dissertation theses and are appointed to the commissions for the presentation and defence of dissertation theses, which is the case also at other faculties.

The eClub led by Jan Šedivý is a unique platform for young talents at the Czech Institute of Informatics, Robotics and Cybernetics CTU (CIIRC). Its main aim is to support innovative ideas of students and to put their business plans into practice. Student work is supported by scholarships from the CTU Media Lab Foundation, in which partner industrial companies are involved as sponsors of this scientific incubator (e.g. Certicon, Seznam.cz, Cybex, etc.) CIIRC also supports doctoral students and postdoctoral students by organizing lectures by leading experts in various fields.

TRANSFER OF TECHNOLOGIES AND COMMERCIALIZATION

Study programmes at CTU are strongly focused on preparation of students for their future professions in the respective industries. Depending of their focus, all faculties are in various ways very closely connected with experts from the application sector, who participate in designing interesting tasks which are then rewarded by industrial partners. Departments for Transfer of Technologies at individual faculties are put in

charge of cooperation with the manufacturing sector that serve as points of contact for both students and staff at the faculty to deal with potential commercialization. In case of most faculties and university institutes, the primary concern is the use of the innovation potential in industry. Partners are involved in innovation brainstorming sessions, where ideas for new products, applications and subsequent cooperation are generated. The Faculty of Civil Engineering, the Faculty of Mechanical Engineering, the Faculty of Electrical Engineering, the Faculty of Transportation Sciences and the Faculty of Information Technology cooperate directly with industry in the given sector. On the other hand, the Faculty of Nuclear Sciences and Physical Engineering and the Faculty of Architecture mostly cooperate with public administration or state enterprises such as ČEZ, a.s. The Faculty of Biomedical Engineering has very specific partners as it primarily welcomes important experts from practice in its Scientific Council and at the same time the obligatory practice of students is an important part of this cooperation.

All faculties, the Masaryk Institute of Advanced Studies and the Klokner Institute invite outside experts from the application sector to participate in their accredited study programmes. Some of them also take on the role of supervisors in doctoral study programmes. In addition, faculties and institutes are constantly seeking to deepen their cooperation with industrial partners in the framework of contractual activities, testing and forensic expert opinions.

At CTU, protection of intellectual property and technology transfer are taken very seriously, which is why CTU has its own patent centre, technology transfer department and InQBay incubator. In 2019, the CTU Licence Fund also provided support for the reimbursement of costs of protection of intellectual property abroad.

In 2019, the total income from transfer of knowledge and research results to practice totalled CZK 391,150,043. The source of the money is mainly contractual research and consultations and advisory. Income from newly concluded licence agreements alone amounted to CZK 22,064,000. Compared to 2018, there was an increase of more than CZK 20 million in absolute value and a significant increase in the total number of 5,866 newly concluded licence agreements and contractual research, consultations, advisory and paid courses for employees of entities from the application sector from 3,596 in 2018. However, the average revenue per contract decreased from CZK 103,000 in 2018 to CZK 66,700 in 2019.

SUPPORT FOR HORIZONTAL MOBILITY

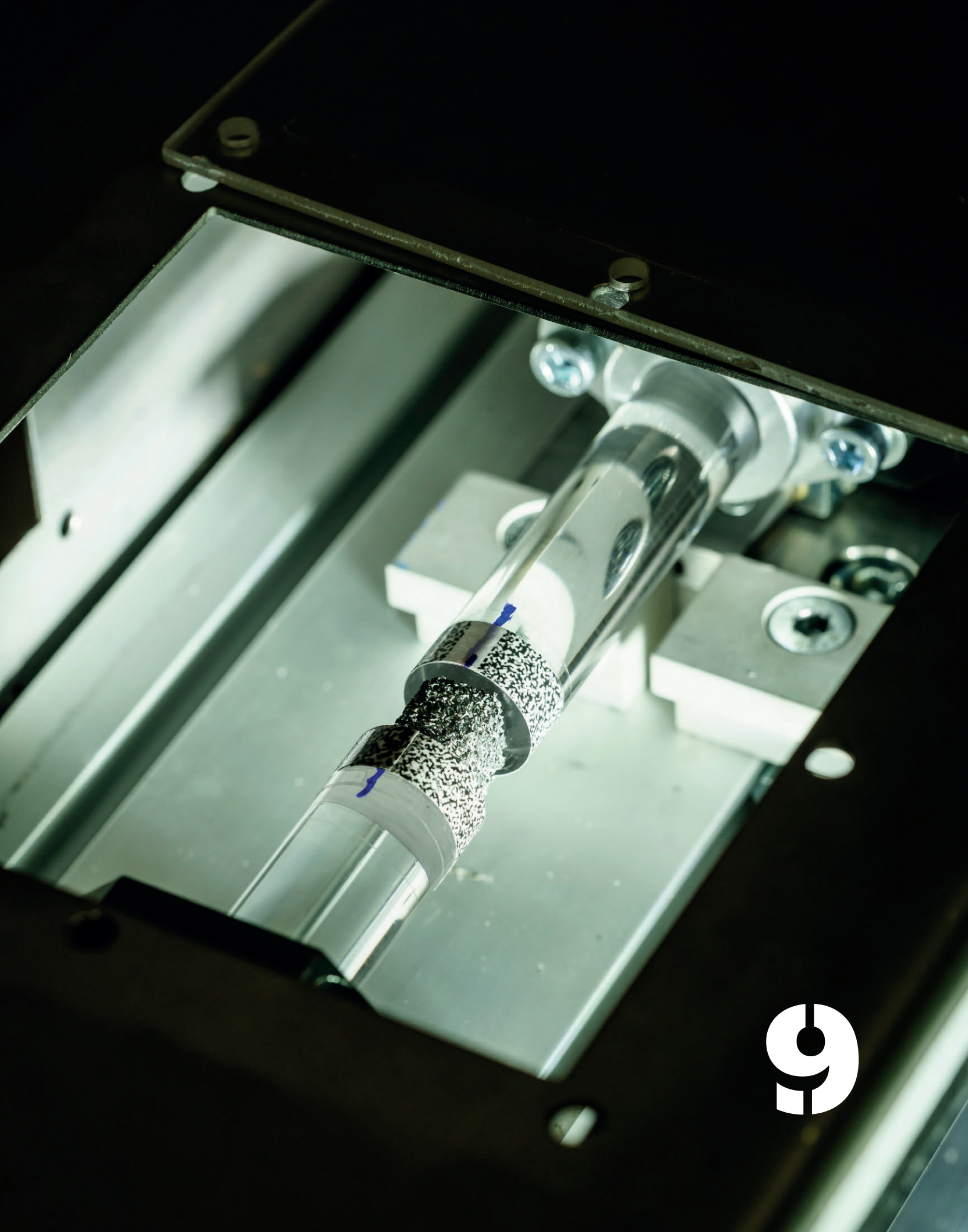
Cooperation with the application sector on the creation and transfer of innovations and their commercialization is one of the issues that still require a lot of attention at CTU. The Department for Technology Transfer at the Rector's Office is responsible for contracts on transfer of copyright and provides a wide range of specialized services focused on the administration of commercialization of the results of science and research, and support for newly established companies. This department is also responsible for patent protection of successful projects in Europe, the Americas, Asia and Africa.

Various subjects were created at different faculties dealing with the support of innovative entrepreneurship within both bachelor and master study programmes. For example, the research group Centre of Business Informatics at the Faculty of Information Technology helps students with issues related to entrepreneurship by creating business models and business case studies.

Some faculties use long-term contacts with many foreign universities and research institutes, which often share the best practices of transfer of results of science and development into practice.

It must also be noted that, for example, the Faculty of Architecture is a multidisciplinary workplace by definition of the architectural profession, therefore horizontal intersectoral student mobility occurs both in the framework of instruction (students graduate in three different fields – namely social sciences, technical and artistic fields, of which each has approximately the same share), as well as in the form of participation of students and academic staff in research, both basic (GA ČR) and applied (TA ČR, NAKI, contractual research). This approach can be documented by research in the field of national and cultural identity (NAKI), in which also academic staff and FA students are included also at other constituent parts of CTU (e.g. the Klokner Institute – NAKI DG16P02M050 Optimisation of Observations and Assessment of Heritage Structures, Faculty of Civil Engineering – NAKI DG16P02M055 Development and Research of Materials, Processes and Technologies for Restoration, Conservation and Reinforcement of Historical Brick Structures and Surfaces and Systems of Preventive Protection of Historical and Listed Buildings at Risk of Anthropogenic and Natural Damage, or NAKI DG18P02OVV033 The Methods for Achieving the Sustainability of Industrial Heritage Steel Bridges).

The Klokner Institute is a good example of intersectoral mobility of students and staff in the fields of construction, materials engineering, chemistry, transportation, power engineering or the above-mentioned monument care. Being an interdisciplinary department at CTU, the University Centre for Energy Efficient Buildings is a meeting point for professionals and a centre of collaboration for researchers and students from different faculties, fields of study and departments. Intense enhancement of further cooperation within CTU, external cooperation with both national and international research institutions and the industrial sector, as well as with foreign industrial and academic entities is one of the centre's main strategic goals. The University Centre provides scientific background for joint projects and student work. Being a CTU part without own accredited study programmes, the centre is better placed to provide conditions for this kind of work than individual faculties. In 2019, a total of 90 subsidy grants and 100 commissions within contractual research were implemented at UCEEB. Examples of successful cooperation include testing of the S.A.W.E.R prototype intended for extraction of water from air in deserts, which will be part of the Czech pavilion at EXPO 2020 in Dubai. The Faculty of Information Technology almost doubled the amount of contractual research in 2019 as the faculty is shifting from being solely a source of high-quality junior employees to also being a source of innovation.



Ing. Radek Holý, Ph.D. / Vice-Rector for Informatics

"The system of quality assessment can be set only provided there is enough relevant data available, a good methodology and correct setting of indicators. At the start, however, it is necessary to define a strategic plan of where CTU is heading in the next years. There is still a lot of work to be done in quality monitoring. The Internal Evaluation Board has confirmed in its conclusions that we have already taken the initial steps towards excellent results."

9 Ensuring quality and assessment of educational, creative and other related activities

The traditional values of CTU that have been confirmed throughout its existence include heterogeneity and a considerable degree of autonomy of educational and creative activities of individual faculties and university institutes. This also corresponds to the structure of the system of ensuring and controlling quality.

At CTU, the quality of educational, creative and related activities is understood as the fulfilment and enhancement of standards of the main activities carried out at CTU in accordance with the European concept of the level of university education and research and in accordance with its mission and goals as detailed in the CTU Statute, the Strategic Plan and other internal regulations of CTU. The system draws on the focus, medium-term orientation and goals of CTU and develops the concept of development of CTU formulated in the CTU Strategic Plan, the CTU Strategic Development Plan and in its annual updates - Plans for the Implementation of the Strategic Plan.

At CTU, data is used for the assessment that is based on qualitative and quantitative information stored in the information system and validated by individual constituent parts of CTU. An example of an important source in the field of creative activity is the application https://v3s.cvut.cz (hereinafter referred to as the "V3S Application"), where the results of publishing activities, applied research and other activities of creative workers in the scientific community are recorded. The V3S Application is used to send results achieved at CTU to the Register of Information on Results (RIV), to experts for statistical analyses and for internal assessment. More detailed information on the assessment of the quality of creative activity is provided in the Report on the Internal Assessment of the Quality of Educational, Creative and Other Related Activities at CTU.

MAIN ACTIVITIES UNDER THE LONG-TERM PLAN

CTU's mission is to provide its students with high-quality education in line with the focus of individual faculties in order for them to be successful in their respective fields of study at the national and international level. The system of ensuring and assessment of the quality of educational, creative and other related activities at CTU (hereinafter referred to as the "System") has long been motivated by efforts to maintain and continuously improve the position of CTU as the best technical university in the Czech Republic and improve its international ranking.

Although many components of the current System have not been explicitly codified yet, CTU as a whole has achieved a good level in all activities. This can be documented by CTU's position in the world rankings of universities, considering the low amount of contribution from the state budget compared to similar universities around the world. In the international QS World University Ranking, CTU has repeatedly achieved the best ranking among technical universities in the Czech Republic and is second only to Charles University among all universities in the Czech Republic. In the worldwide evaluation of universities QS 2018, CTU is ranked between 491-500 among 4,388 evaluated universities (i.e. just outside the best 10% of universities). In ranking by subject, CTU is ranked number 220 in Engineering and Technology (the best in the Czech Republic), number 220 in Natural Sciences (the 3rd in the Czech Republic after Charles University and the Czech Academy of Sciences); in more narrowly specified subjects, CTU is ranked between 101-150 in Civil & Structural Engineering, between 151-200 in Architecture, Physics & Astronomy and Mechanical, Aeronautical & Manufacturing Engineering, and between 201-250 in Electrical & Electronic Engineering and Computer Science & Information Systems.

From the perspective of long-term development in HR, the fulfilment of requirements for the granting of the HR Award is a great achievement. This is closely linked to the systematic work on the preparation of the Career System and the Methodology for the Assessment of Employees in the Field of HR.

EDUCATIONAL ACTIVITY IN BACHELOR AND MASTER STUDY PROGRAMMES

The quality management system in the field of educational activities is based on the dean's primary responsibility towards the faculty's scientific council and academic senate, as well as on the dean's secondary responsibility towards university bodies. The implementation of all study programmes is managed by the subject guarantors in cooperation with heads of the relevant departments or faculty institutes. The interaction between the individual study programmes, including doctoral study programmes is coordinated by vice-deans for bachelor and master studies, or by vice-deans for creative activities and doctoral studies.

Study programmes are accredited and subsequently, during their implementation, continuously updated in order to meet the latest requirements for profiles of technically educated university graduates at the national and international level. The fact that CTU graduates are in demand is evidenced by the situation on the labour market where demand for CTU graduates has long exceeded their numbers. The vast majority of graduates work in fields they have studied or in related fields. In case of generally focused programmes, a wider range of jobs taken on by graduates is expected and testifies to the quality of the provided education with respect to its general focus and thus its universality.

The university-wide electronic student Questionnaire is used at all faculties to assess the quality of educational activities and it plays a crucial role at most of them. In this application, faculties can define their specific requirements for the collection and evaluation of ballots. Students submit them anonymously or they can decide to reveal their identity. In addition to giving grades, they can also add a verbal comment.

In 2019, several decisions and measures were adopted to increase the quality of education. It was concluded that obtaining an institutional accreditation was a key. It was recommended to prepare development projects for the creation of information support for processing of data in the monitored indicators so that the CTU management and the CTU Internal Evaluation Board (IEB) can work with them and integrate them into the system of quality ensuring and assessment. Another important tool is the creation of an internal mechanism of a systematic support for teaching in English for self-funding students in order to increase their share at CTU.

DOCTORAL STUDIES

By definition, educational and creative activity in doctoral studies draws on contemporary knowledge on the international level. CTU prefers that all outcomes of doctoral students' creative activity (specialized studies, publications, dissertation theses, etc.) be written in the English language.

Doctoral students in technical disciplines must present the results of their creative activity in the form of publications in journals and conference proceedings, preferably included in the citation databases WoS or SCOPUS. Doctoral students are encouraged to publish the results of their dissertation theses as articles in impacted journals. In case of applied research, in addition to publications, patents and their licensed use in application and commercial practice are considered as the most important outcomes.

The quality and content and the novelty of contribution to science in case of proposed topics of dissertation theses is evaluated by specialization committees of doctoral study programmes. As part of the assessment it is taken into account, among other things, whether in recent years the supervisor has achieved quality publication results related to the given topic. The supervisor is responsible for the quality of the dissertation thesis.

CREATIVE ACTIVITY

The key criteria for assessment of quality of creative activity include publishing activity and the results of applied research in used utility models and inventions listed in the V3S database, which includes the results of research and other creative activity, including contractual research. The nature of the results varies in accordance with the focus of the individual constituent parts of CTU. For technically oriented faculties and university institutes, one of the most important criteria of the quality of creative results is publication in impacted journals, preferably the best in the given field, i.e. in Q1 (i.e. journals that belong among the top 25% journals in the given field). CTU uses the V3S Application, which, in addition to searching for publication results, enables to analytically compare results of employees, departments/institutes and faculties. These analyses are used by senior managers to evaluate the quality of creative activity and are subsequently reflected in the institutional support of excellent results and support of junior employees.

CTU uses the outputs of RVVI expert panels in the 2nd pillar - Evaluation of Results of Research Organizations. The new system of external assessment will be launched at CTU along with the transition to Evaluation 2017+.

In the area of creative activity, steps were taken to support the parameters focusing on increasing the share of foreign reviewers of dissertation theses, ensuring support for the involvement of excellent postdocs from abroad (with H-2 as a minimum) in research teams. The motivation for academic workers to spend at least six months at a top workplace abroad increased. Finally, a methodology for the allocation of institutional funds for the development of a research organization supporting the excellence of creative activity was prepared.

OTHER RELATED ACTIVITIES

The individual constituent parts of CTU have expert institutes that provide expert activities for courts in the fields for which they are appointed. Their expert activities are documented in expert logs kept at the respective workplaces.

CTU attaches great importance to working with human resources, especially when it comes to motivation of promising

young employees. Career systems have been implemented at some constituent parts of CTU, which apply to academic and other creative staff. Educational and creative activity is periodically evaluated by relevant managers.

In 2019, CTU was one of the founding institutions of prg.ai (Prague Artificial Intelligence), in which CTU, Charles University and the Academy of Sciences joined forces with the Municipality of Prague in order to turn Prague into a centre of artificial intelligence of European renown.

In 2019, in order to increase the quality of other related activities, it was necessary to wrap up the discussions on the preparation of the principles of career systems at CTU, start work on the CTU Long-Term Plan of Development and develop a long-term plan of increasing the quality of accommodation services at individual dormitories, among other things. Further, a long-term strategy for the development and integration of CTU information systems at the level of CTU and faculties must be developed.

GENERAL EVALUATION OF THE SYSTEM OF ENSURING AND INTERNAL ASSESSMENT OF QUALITY

It is a tradition that the structure of the system of ensuring and assessment of quality at CTU is based on the principle of respect of the powers of individual faculties, university institutes and other constituent parts and their diverse focus. Even with this autonomy of educational and creative activity that has always been respected at individual faculties and constituent parts of CTU, we have managed to keep the quality at a good level, also in international rankings, where CTU has traditionally been ranked highest among Czech technical universities in individual technical fields. However, CTU seeks to achieve even better ranking and gradually become one of the world's top research universities.

In order to achieve this goal, CTU must meet and gradually raise the level of standards of the main activities in accordance with the European concept of quality of university education.

INTERNAL EVALUATION BOARD

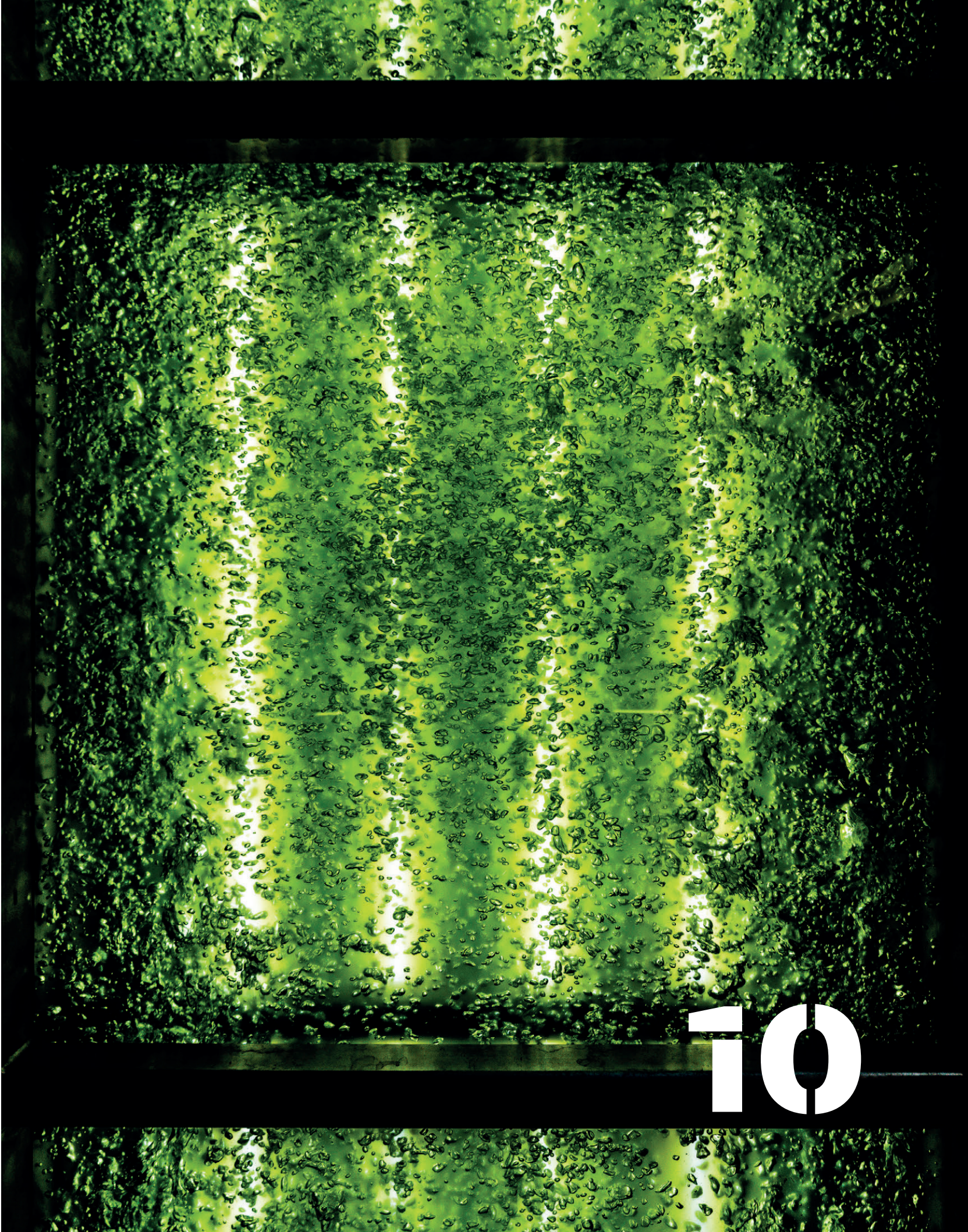
At the university level, the quality management system is coordinated at by the Internal Evaluation Board (IEB). This academic self-governing body is responsible for the course of internal assessment of the quality of educational, creative and other related activities of CTU. It approves the draft rules of the system of ensuring quality of all activities, prepares a report on the internal evaluation of these activities and its amendments, and conducts other related activities leading to ensuring a high level of all processes at CTU. The Rector is involved in the quality management process as chair of the Internal Evaluation Board and also in case of complaints or appeals submitted by students or in case of other issues.

The CTU Internal Evaluation Board has 15 members. In the past period, an external member was replaced – Prof. P. Noskievič, who was appointed to the board of the National Accreditation Bureau, which created a potential conflict of interest. As a replacement, a new external member was appointed in the person of Prof. B. Kratochvíl from UCT, who was actively involved in the board's activities.

In 2019, the Internal Evaluation Board met a total of eleven times. Minutes of meetings together with resolutions are published in the public part of the CTU website. In addition, meetings of working panels for individual areas – educational activity, creative activity and other related activities – were held. These panels discuss the updates of the Report on the Internal Assessment and prepare its amendments.

The key topics of the board's meeting included the preparation of documents and internal regulations for submitting an application for Institutional Accreditation. It concerned primarily the preparation of the Rules of Accreditation, the Standards of Accreditation and Self-Assessment Reports for individual areas of education. Respective panels were set up within the board for individual areas of education. The originally planned deadline for submitting the application for Institutional Accreditation to the National Accreditation Bureau was postponed until next year due to the amount of documents that need to be prepared.

Another key issue regularly discussed at IEB meetings was the preparation of the CTU Career System. The actual processing was conducted within the framework of the activities of the HR Award. Based on a broad discussion across all constituent parts of CTU and after all comments were dealt with, a consensus was reached and there is a realistic assumption that the Career System will be approved as an internal regulation in the following period.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10 National and international excellence at CTU

INTERNATIONAL RESEARCH, DEVELOPMENT AND CREATIVE ACTIVITY

CTU welcomes the possibility to mention at least some of the activities and results from the wide range of creative activities of its students and staff. This overview, random by nature, serves as a proof of the high quality of scientific work carried out in all disciplines cultivated at CTU and its perception in society both at the national and international level.

First, it is necessary to highlight the ever-growing involvement in international projects, where CTU scientific teams have leadership and management roles and carry out specialized research. A lot of the projects are implemented under the Horizon 2020 community programme, including, e.g., the Evolving Language Ecosystems (ELE) project, with the participation of MSc. Jan Vítek, Ph.D., of the Faculty of Information Technology. Other projects include projects implemented at the University Centre for Energy Efficient Buildings (UCEEB), which, in collaboration with top institutions such as the Technical Research Centre of Finland (VTT), the Catholic University of Leuven, the Dresden University of Technology and the Technical University of Denmark, participated in the joint preparation of H2020 projects. Further research under the H2020 programme - Penetrating Particle ANalyser (PAN) programme, of which the Institute of Experimental and Applied Physics is a member together with the University of Geneva (Switzerland) and the Istituta Nazionale Di Fisica Nucleare (Italy), aims to develop a unique particle detector for space missions.

Other international projects in which researchers from the Faculty of Information Technology participate include, for example, CELSA – Dynamically Reconfigurable Architectures for Side Channel Analysis Protection of Cryptographic Implementations with the participation of Dr. Ing. Martin Novotný, or the Research Center for Informatics (RCI) with a team composed of representatives of FEL and FIT – Prof. Dr. MSc. Michal Pěchouček; Prof. Ing. Pavel Tvrdík, CSc.; Prof. Ing. Róbert Lórencz, CSc.; and Prof. Ing. Jan Holub, Ph.D. The Faculty of Transportation Sciences seeks to deepen interdisciplinary cooperation between workplaces, modernize common laboratories, cooperate with foreign partners and educate young researchers and Ph.D. students. FTS participates in the solution of the excellent project INAFYM, here emphasis is put on interdisciplinary cooperation between CTU workplaces (IEAP, FBME, FD, CIIRC); the 3rd Faculty of Medicine; Charles University in Prague; the Faculty of Electrical Engineering, University of West Bohemia in Plzeň; the National Radiation Protection Institute; the Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences, where research is focused on progressive technologies of ionizing radiation detection and their applications in space, hadron therapy, imaging in medicine, biology, materials research, radioecology and fundamental physical experiments.

Also addressing the global issue of water scarcity is very important, in which the Faculty of Mechanical Engineering is involved through designing and implementation of the S.A.W.E.R. unit intended for extraction of water from air in deserts, which will be the main exhibit of the Czech national exhibition at EXPO 2020 in Dubai.

International research, development and creative activity is also reflected in cooperation and integration into international associations and professional platforms. Thanks to its expertise and uniqueness, the Faculty of Biomedical Engineering has become a member of The European Alliance for Medical and Biological Engineering and Sciences (EAMBES), the Association of University Educators of Non-Medical Health Professions in the Czech Republic. This membership means that the faculty can actively participate in the association's activities, get access to the findings achieved at other faculties in the Czech Republic that also implement accredited study programmes in health care and participate in changes resulting from the amendment to the Higher Education Act (Act No. 137/2016 Coll.). Furthermore, FBME is also member of the International Police Academy Association (INTERPA), which has long focused on improving the education of police and security forces and deepening cooperation and on organization of exchange work and study programmes

between universities of the individual member states. Currently, 73 educational institutions from 57 countries are members of INTERPA (http://www.interpa.org/ member-states.html).

In the framework of international research, development and creative activity, UCEEB closely cooperates with its German partners on highly energy efficient buildings. In 2017, UCEEB became the first non-German member of the Netzwerk Effizienzhaus Plus network, whose members are leading German construction companies and universities.

In March 2019, CIIRC became member of the CLAIRE (Confederation of Laboratories for Artificial Intelligence in Europe), which was an important step for the whole university, opening new avenues for cooperation in the field of Industry 4.0 and artificial intelligence.

The CTU Central Library is a member of prestigious international associations, including, for example, CrossRef USA; the International Association of University Libraries (IATUL), UK; the Ligue des Bibliothèques Européennes de Recherche (LIBER), the Netherlands; MDPI – Publisher of Open Access Journals in Switzerland; ORCID (Open Research and Contributor ID), USA; and SCOAP3 Sponsoring Consortium for Open Access Publishing in Particle Physics, Switzerland. At the national level it is a member of the board of the Association of Libraries of Czech Universities (AKVŠ).

NATIONAL RESEARCH, DEVELOPMENT AND CREATIVE ACTIVITY

At the national level, research, development and creative activity is developed primarily through projects such as the Image Processing Laboratory led by doc. RNDr. Ing. Marcel Jiřina, Ph.D., the Intelligent Embedded Systems Laboratory of Ing. Miroslav Skrbek, Ph.D., or BigCode – a scalable analysis of large databases of programmes headed by MSc. Jan Vítek, Ph.D., and many more, funded under VRR44 (Support for the Development of Study Environment at CTU), TA ČR, GA ČR and the Ministry of Education, Youth and Sports. We should also mention the National Competence Centres – for instance, the Faculty of Mechanical Engineering participates in seven out of the 13 centres. In 2019, FME also made significant progress in building an ecosystem with GEAC. In 2019, FME completed and put into operation the second aircraft engine test centre in Hradec Králové; the construction of the last two test centres has been completed and they are to be put into operation. The aim of the Centre of Advanced Applied Natural Sciences (CAAS) at the Faculty of Nuclear Sciences and Physical Engineering is to create an effective environment for interdisciplinary research.

NATIONAL AND INTERNATIONAL AWARDS AT CTU

Same as in previous years, also in 2019 students and academic staff at CTU received many international awards for research, creative and social activity. Below you can find a selection of the best international and national awards across a wide range of areas and sport.

International scientific awards

- Ing. Martin Ševeček, Ph.D., won second place and the Becquerel 2019 award for his doctoral research as recognition from the French Embassy in the Czech Republic. The award was presented to him by Nobel Prize winner Jean-Marie Lehn at a ceremony at the National Museum.
- Ing. Martin Cesnek won third place and received the Becquerel 2019 award for his doctoral research from the French Embassy in the Czech Republic. The award was presented to him by Nobel Prize winner Jean-Marie Lehn at a ceremony at the National Museum.
- A student team composed of Ing. Lukáš Brchl, Bc. Karel Čech, Bc. Marián Hlaváč and Ing. Adam Podroužek won the main prize with their start-up Dronetag in the most prestigious European Galileo Masters competition, focused on satellite navigation.
- A student team composed of J. Ács, J. Havránek, V. Souček and I. Trummová placed third in the Capture the Flag competition organized by Accenture and focused on information security.
- Bc. Marek Kordík won second place with his paper on the Assessment of Tidal Volume in High-Frequency Oscillatory Ventilation at the international conference POSTER in Biomedical Engineering.
- Prof. Milan Jirásek at the Faculty of Civil Engineering received the Most Promising Textbook Award 2019 given by TAA, USA, for his book Creep and Hygrothermal Effects in Concrete Structures.
- Prof. Jiří Matas at the Faculty of Electrical Engineering received a special award from the AI Awards 2018 project.

International competitions

A team of students from the Faculty of Civil Engineering won in the Trail by Vinci Construction competition focused on innovations and new technologies in construction, attended by 1,259 participants from 58 countries, with a design of a robot for cleaning construction sites.

Lucie Horáková of the Faculty of Architecture became the overall winner as well as winning first place in Product Design in the international competition Best in Design for designers under 30 years of age for the design of the TUBO interior lighting.

National competitions

CTU received awards in a number of competitions. Teachers at CTU are involved in many of these events as professional advisers or organizers. But this part is devoted to winners from among the students who represented their faculties.

Libor Bukata of the Faculty of Electrical Engineering won first place and the Werner von Siemens Prize in the category of works dealing with the concept of Industry 4.0 for his dissertation thesis.

International sports awards

We must also mention the participation of our students in sports competitions organized by individual constituent parts of CTU. The Institute of Physical Education and Sport closely cooperates

with faculties and is responsible for the university's participation in sports competitions. In the competition of universities, CTU won a total of 31 medals, of which 7 were gold medals. The most prestigious award went to Ing. Vít Přindiš, a doctoral student at the Department of Biomedical Engineering FBME, who won the first individual medal. After last year's silver medal from the continental championship in Prague, he became the European champion in water slalom for the first time in Pau, France, on the same course, where he became vice world champion two years ago.

In 2019, Martina Satková, who represents the Czech Republic in water slalom and white water racing and who has won 17 medals at World Championships and European Championships, was named the best athlete at CTU under the auspices of the Rector.

INTERNATIONAL ASSESSMENT OF THE UNIVERSITY OR ITS CONSTITUENT PARTS, INCLUDING INTERNATIONAL ACCREDITATIONS

For several years now, CTU has participated in the QS World University Ranking, where it was ranked as number 498 in 2019, which represents a move upwards of 40 places compared to 2018 and is now ranked among the top 500 universities in the world. The QS World University Ranking is one of the most prestigious international comparisons of universities. Universities are ranked using six metrics: academic reputation, employer reputation, faculty/student ratio, citations per faculty, international faculty ratio and international student ratio. High-quality basic, applied and innovative research are at the core of CTU's move upwards in the international rankings together with efforts to improve the quality of studies and expand international cooperation in the field of pedagogy and research, exchange of students and academic staff. Also the increase in the number of foreign academic and research staff and the achievements of basic and applied research at CTU are taken into account.

Another of the prestigious rankings, The Times Higher Education World University Rankings ranked CTU between 801–1000 in 2019. This ranking uses 13 indicators, where two of the indicators together make up a full third of the overall evaluation and are based on the results of the annual evaluation.

CTU and its constituent parts strive to incorporate the suggestions arising from international rankings and evaluations in their educational and creative activity in order to continuously improve the conditions for study and research, which in turn will lead to better rankings.

Ing. Lucie Orgoníková / Chancellor

"The importance of CTU grows in time. The speed of technological development strengthens CTU's role in society, which turns to renowned scientists with trust and expectation. I'm very glad to see little researchers learning about the world of technology at the university primary school and kindergarten Lvíčata and to get feedback from external partners on how great it is to collaborate with CTU."

Third role of the university

Since the end of the 19th century in the USA and since the 1960s in Europe, the emphasis on universities being active within their communities – especially in the city and the region where they are based – has been increasing. Universities are believed to have a positive impact on employment, development of industry and services thanks to innovation, cultural potential (cultural activities, lectures for the public), social care services, and more. Since the 1970s, the demands on the socio-economic benefits of universities regarding an increase in the economic competitiveness of a country, especially in connection with the transition to a knowledge-based society, have been growing.

CTU cooperates with employers on several levels, including educating students for industry, services, state administration and self-government, or in devising study programmes. Further, it concerns relationships in science and research and technology transfer in science parks, incubators and start-ups. Employers send their experts to pass on their knowledge to students and to participate in social and socio-cultural activities, including lectures, exhibitions and more, intended for the general public. Academic workers in turn appear in the media and in this way they pass on their knowledge not only to their peers, but also to the general public. All this contributes to the increase in credibility of the university and has an impact on society. At present, the importance of the third role of the university is growing, which is appreciated also by people who previously had not given any thought to this mission of universities.

The CTU Board of Directors is a body composed of representatives of public life, local self-government and state administration. It is the eminent body that provides feedback on the role of the university towards its surroundings. In 2019, one third of the members of the CTU Board of Directors were replaced, also with regards to its function in society. The Rector nominated the chairman of the Chamber of Deputies of the Parliament of the Czech Republic and the mayor of Prague 6, where CTU is based and consequently has a great impact on life there. We have not forgotten about the industry either – it is represented by a representative of the European railway sector and a representative of smart solutions in industry. The former rector and currently vice-rector of Tomas Bata University in Zlín was nominated as a representative of the university sector. At the end of the year, a new leadership of the CTU Board of Directors was elected, whose chair is now Prof. Ing. Petr Sáha, CSc., and vice-chairs are Ing. Dana Drábová, Ph.D., DrSc., and Mgr. František Bureš, MBA, LL.M.

CTU also operates the university primary school and kindergarten Lvíčata, which is part of the Dejvice campus. In this way, CTU contributes to strengthening the third role of the university. The kindergarten allows parents-employees to return to work earlier than it would normally be possible and parents-students to carry on with their studies.

The primary school, in addition to areas specified in the curriculum framework for lower primary schools, focuses on technical education. There are more lessons of mathematics and informatics, and in the fourth and fifth grades a subject called Science is added, which serves as a foundation for scientific subjects that students study in further years. The school also works on science-oriented projects. The aim of these activities is to introduce technical education in its entirety already to pre-school children and primary school pupils. The school would like to cooperate with other schools and pass on to them its experience and procedures applied in this field of education.

Students take part in a number of competitions, including the Olympics in Logic, the Mathematics Kangaroo, Pangea, the Mathematical Current and others, in which they achieve excellent results. Also in 2019, the Kids' University was organized for students at primary schools and in the corresponding years of multi-year grammar schools in the form of a day camp. During the one-week interactive and experiential programme, children learned about the individual faculties and technical fields of study at CTU and had the opportunity to visit unique technical laboratories or observe physical experiments.

We believe that this investment in children will pay off and that we will meet them again as students at our university.

IMPACT AND RESULTS OF TRANSFER OF KNOWLEDGE TO PRACTICE

The transfer of research and development results and knowledge to practice is still being intensively developed and dealt with at CTU, primarily due to its technology focus, which is closely linked to the application sector. The involvement of experts from the application sector in devising study programmes, a high share in commissioning and subsequent evaluation of bachelor, diploma and dissertation theses and the possibility for students to participate in projects addressing specific problems arising from practice have already been mentioned in previous chapters. A high share of industry experts at CTU helps students understand the reality of professional life. At the same time, however, systematic monitoring and evaluation are necessary and they take place within the system of quality evaluation of newly approved study programmes. It is in the interest of all faculties and university institutes to involve junior scientists in research, development and innovation projects. Also contractual research plays an important role in collaboration with the business sector and public administration.

In 2018, CTU launched its business incubator InQbay, which in 2019 organized a number of educational events and workshops focused on business skills and offered co-working environment with a range of amenities and technical equipment. Part of InQbay is also an online eAcademy which offers programmes on the development of financial and business skills, communication and marketing or intellectual property protection.

The successful CIPA (Czech-Israel Partnership Accelerator) programme continued also in 2019. The programme offers students a possibility to participate in international student teams in which they address problems defined by industry. The activities take place under the professional mentoring of commercialization specialists from Israel and the Czech Republic. Cooperation with Israel is also developed in the framework of the PATRIC (Prague Advanced Technology and Research Innovation Center, a.s.)incubator project, where the experience of a partnership between an external entity and a university is transferred with the support of private capital.

When it comes to specific projects, we could mention, for example, the Nanocem consortium, composed of research and industrial partners engaged in basic research of cements and concrete, with the participation of the Faculty of Civil Engineering. The Faculty of Biomedical Engineering also understands the importance of the transfer of knowledge to practice and is looking into various innovative concepts, organizes days and meetings with industrial and other partners. FBME transfer activities also include the sale of monographs, studies and analyses, patents and the sale of patents, licences and know-how, establishment of new relationships and cooperation with existing spin-off companies. In addition, it directly cooperates with commercial entities, i.e. it provides services, consultations and carries out commissioned research, implements joint research and development projects. The University Centre for Energy Efficient Buildings, whose primary focus is on cooperation with practice, is very successful in transfer of knowledge and 95% of its turnover is generated by joint projects with industrial partners. The maximum permitted legal share of 20% is then dedicated to contractual cooperation which consists of over 100 individual contracts from over 70 partners. There are now about 20 different products on the market (e.g. a sensor for monitoring school classrooms, fasteners for wooden structures or roof windows for passive buildings), which were developed in UCEEB in 2019.

The Czech Institute of Informatics, Robotics and Cybernetics (CIIRC) plays an important role in extending the transfer of results to practice. In 2019, after intensive preparation, CIIRC launched the RICAIP centre, focused on advanced industrial production. This project is unique in that it includes major industrial partners and also in that it was granted a record CZK 1.2 billion in support.

The Faculty of Mechanical Engineering is very successful in transfer of knowledge to practice as evidenced by the special award by TA ČR for many years of excellent results in applied research supporting one of the key industries in the Czech Republic – the automotive industry, as well as the jury award in the Visionaries 2019 project for a comprehensive support to applied research benefiting society and the implementation of innovation in mechanical engineering.

PATENTS

Patent protection is an independent, yet crucial part of cooperation with the private sector. In 2019, the Faculty of Mechanical Engineering together with UCEEB received a patent for the Equipment for Extracting Water from Ambient Air with the Possibility of Autonomous Operation, which is the basis of the unique S.A.W.E.R. equipment. The second European patent granted to the Faculty of Mechanical Engineering is the Method of Controlling Spherical Motion of a Body. Also the Faculty of Electrical Engineering had seen a growing trend in submission of new patent applications and utility models. FEL was granted nine national and ten international patents in 2019.

ACTIVITIES IN THE REGION

CTU occupies an important position not only in the capital of Prague, where the largest part of the university is located, but also in the Central Bohemian Region, where the Faculty of Biomedical Engineering operates. The Faculty of Nuclear Sciences and Physical Engineering and the Faculty of Transportation Sciences have study centres in the Ústí nad Labem Region. UCEEB is based in Buštěhrad near Kladno and thanks to its location, UCEEB encourages and contributes to the development of human resources in the region. This goes also for the Faculty of Civil Engineering, which closely cooperates with UCEEB. FCE also cooperates with Prague 6 and the capital of Prague. The Faculty of Mechanical Engineering has engine and car testing laboratories in Roztoky near Prague. The capital of Prague uses experts from across CTU, for example the Klokner Institute assessed the lifespan of structures that are or should be protected, such as the Libeňský Bridge or the Hlávkův Bridge. Expert opinions by experts from the Klokner Institute and other constiutent parts

of CTU are also used by other public administration bodies and entities, such as ministries, the Road and Motorway Directorate, Správa železnic, etc.

Activities in the region are question of not only the place and accessibility, they also play a role in people's perception. Thanks to the various events and services carried out on the CTU campus, including at its constituent parts, the university makes an increasingly stronger imprint on the community of Prague 6, but also parents of talented children who visit laboratories and workplaces during Open Doors Days, the Festival of Science and the Night of Scientists are becoming more aware of the activities of CTU. The CTU Archive and the Central Library also play a significant part in the overall perception of CTU as an important part of life in the capital. These two, rather low-key institutions, organized a number of cultural and specialized events in 2019, such as the exhibitions Dark Autumn 1939 - Fate of CTU and its prominent figures after the closing of universities and the Velvet Autumn at the Czech Technical University, as well as events for younger school children called Children's Library, a 90-minute programme, where the CTU Central Library presented its acitivities to children in 1st-3rd grades.

Another activity indicative of the importance of CTU is cooperation with the public administration on the development of the Budějovická area in Prague. This project included preparation of student studio works in the given area, a three-day studio workshop in cooperation with Česká spořitelna with a presentation of developed concepts in a building on Budějovické Square in Prague 4 and an exhibition of students' works on the development of this area on three scale levels with emphasis on public spaces and on whether Česká spořitelna's presence there should continue.

ACTIVITIES AND SIGNIFICANCE OUTSIDE THE REGION

In many ways, the significance of CTU also stretches outside the region. One of them is the number of international awards won by students, academic staff, research teams in 2019 together with many international conferences organized or co-organized by CTU or conferences in which CTU scientists and experts participated.

Another way in which CTU is involved is the implementation of government strategies and documents under preparation related to the management of technological development of the Czech Republic. Here we must mention the involvement of CTU experts from the Faculty of Electrical Engineering and CIIRC in the field of artificial intelligence in the preparation and approval of the National Artificial Intelligence Strategy or their significant involvement in the Digital Czechia programme. CTU's unique expertise is also provided to ČEZ, a.s., in the field of nuclear energy and power engineering in general, namely by the Faculty of Mechanical Engineering, the Faculty of Electrical Engineering and the Faculty of Information Technology. The Faculty of Architecture and the Faculty of Civil Engineering play an important part in territorial development across the Czech Republic.

Last but not least, we must mention the CTU's role in the life of society. CTU organizes numerous concerts and other activities, such as exhibitions. CTU also awarded the honorary title of Doctor Honoris Causa to the architect and pedagogue, Prof. Eva Jiřičná, in 2019 as an expression of recognition and accolade for her life-long work in architecture and many years of pedagogical activity in the field of architecture.

In 2019, CTU implemented a unique project through PET-MAT z.ú. In cooperation with Karlovarské minerální vody, it focused on supporting research and innovation of a PET recyclate for architecture and construction. Also in cooperation with the Ministry of Industry and Trade, CTU participated in the international student competition Digital Factory, which led to the creation of a 3D sculpture printed by dozens of 3D printers throughout the Czech Republic and which was then auctioned at the Brno International Engineering Fair at the stall of the Ministry of Regional Development. This project combined the support of sustainable development with modern technologies and the concept of circular economy.

Another important project implemented in 2019 proving CTU's siginificance outside the region was the Collision Cost Analysis – a 2019 research report, which summarized the results and achievements of the Škoda Auto Collission Cost Analysis project in which the Faculty of Architecture was involved. The aim was to develop a support tool for architects at Škoda Auto that would facilitate the process of deciding about the location of new buildings in the factory complex.

Since July 2019, CTU's activities outside the region have gone as far as the Earth's orbit, where the unique detectors developed at the Faculty of Nuclear Sciences and Physical Engineering are now deployed. The detectors were transported to the orbit by the Russian Soyuz 2 launch vehicle.


12

Prof. Ing. Alena Kohoutková, CSc. / Vice-Rector for Construction

"In order to be able to make optimal use of CTU's potential, we have to continuously improve the educational and research infrastructure. The renovation of the existing buildings in line with the university's current needs and available funds is the main part of its investment activity."

12 CTU facilities and investments to improve them

The Czech Technical University in Prague – that's not just science, study and international cooperation. CTU also has buildings, equipment and environment in which all activities developed at a technical university take place. We have put a lot of effort into building a modern campus with laboratories and lecture halls and providing services to students and academic and non-academic staff.

ACCOMMODATION AND CATERING

Good-guality accommodation and catering are an indispensable part of services provided by a university. The total number of beds in CTU dormitories is 7,954. In 2019, CTU canteens served over a million meals to students, around 100,000 meals to CTU staff and over 600,000 meals to other people.

CENTRAL LIBRARY, ITS COLLECTIONS AND SERVICES

In 2019, 4,928 new library units were added to the CTU Central Library (ÚK). In the last two years, the collection has grown by an extra 606 e-books and two extensive collections of specialized e-books used in instruction based on requirements of pedagogical staff invovled in the project OP RDE Support for the Development of the Study Environment at CTU in Prague. A website was created that contains a Guide to E-Books at CTU that provides information on the platforms of e-books available at CTU. In 2019, the database of scientific journals of the American Society of Mechanical Engineers (ASME) was added to the portfolio of the existing core electronic information sources (EIZ); access to Czech standards on the ASPI platform and to standards of the Society for Automotive Engineering (SAE) on the IHS platform was provided. All CTU information sources can be searched using the Summon discovery system.

In connection with the increase in activities and services in the field of information support to science, research and publishing, a department for support to science was established at ÚK in 2019. The department is responsible for bibliometrics agenda, management and correction of data in citation databases, including administration of the CTU institutional profile, it deals with the Open Access and Open Science agenda, storing of full-text publications in DK, and includes editor's offices of scientific journals Acta Polytechnica and Acta Polytechnica CTU Proceedings and administration of publication standards (DOI, Similarity Check, ORCID) and publication platforms (OJS) for CTU. It closely cooperates with universities abroad and actively participates in foreign working groups on a number of topics.

ÚK cooperates with authors in the preparation of their habilitation procedures and procedures to appoint professors, and prepares documents for the statement of publication outputs and citation indexes. In cooperation with V3S and with regard to the RVVI evaluation, the evaluation of CTU and of individual authors, ÚK makes both simple and more complex corrections of data in records or assigned citations with the producers of citation databases.

In 2019, ÚK implemented 73 educational events (seminars, trainings, teaching, courses for doctoral students, excursions for first-year students), which were attended by a total of 1,467 students. The most effective way of information education of students is to invite them to classes taught at faculties' departments and institutes. They are usually subjects related to the preparation of final theses, methodology of scientific work and academic writing. Lectures and trainings using computer technology help students search for and evaluate literature on the topic of their theses, show them how to cite sources properly and avoid plagiarism and other transgressions against publishing ethics. Lectures and trainings are complemented by individual consultations (a total of 114 consultations in 2019).

Detailed information can be found **in the Table Annex, Section 12**.

INVESTMENT ACTIVITIES

The above mentioned services are provided in new and old buildings, which often require high investments in repairs and maintenance. The effort to transform the existing buildings into modern premises are significantly limited by available financial resources.

In 2019, the priority was to fulfill the plan of the ending programme of renewal and development 133221D of the Ministry of Education, Youth and Sports, since in order to receive funding, the included actions had to be completed by 31 December 2019. The following rehabilitation and reconstruction projects were carried out: FEE – Transformation of the inner courtyard area – courtyard E3 on Karlovo Sguare, FEE – Reconstruction of the bottom part of building G, Karlovo náměstí, FCE – Renovation of alternative energy source in buildings of the faculty in Dejvice, FME – Renovation of the entrance gate of the building on Karlovo náměstí, FTS – Flats in the FTS building in Albertov – modification in use to meet the needs of CTU, and CTU Rectorate – Removal of the old IEAP building in Albertov. The total volume exceeded CZK 48 million.

Also in 2019, the preparation and implementation of actions under the newly launched programme of the Ministry of Education, Youth and Sports 133 220D began. The plan included facilities with activities such as design and preparatory work for the renovation of large auditoriums in building B of the Faculty of Civil Engineering, design work for the renovation of the former boiler room in Strahov to be used as the new CTU Archive, design and preparatory work for the renovation of the cladding of hall laboratories in Dejvice and preparation of a public tender for restoration of the listed building of the training centre in Kruh near Jilemnice.

On behalf of the Faculty of Civil Engineering, the Department of Construction and Investment managed and carried out investor's technical supervision of the construction part of the renovation of water management laboratories financed from an OP RDE project. In 2019, as part of own sub-programme, the Service Facilities Administration, in cooperation with the Department of Construction and Investment, completed the preparation for the renovation of the Bubeneč dormitory.

Using own funds, CTU financed the preparation of the concept and preparatory design work for the renovation of the Bethlehem Palace, and similarly the concept, design and preparatory work for the expansion of the premises of the university primary school Lvíčata in the Student House were carried out. The preparation phase and the selection procedure for a contractor for the replacement of a footbridge near the building in Poděbrady were carried out. Also conceptual preparations were made for the future relocation of IEAP, the Klokner Institute and the CTU backup data repository to Motol. All the above mentioned events will continue in 2020 and beyond.

The Department of Construction and Investment is often involved in the preparation of investment projects funded by individual constituent parts and acts as investor's technical supervisor in construction activities of CTU and its constituent parts. Other activities include real estate management and property agenda, such as dislocation and registration.

The above mentioned activities also include technological support using the BIM method, which forms an important independent segment for construction and investment. It includes the creation of a concept and the subsequent implementation of the method into practice (preparation of investment plans, the actual construction, facility management). In 2019, an analysis of the conditions at CTU for the implemetation of the BIM method was carried out. The coordination of the project fully complies with the methodology of the Ministry of Education, Youth and Sports. The preparation of a pilot project at CTU that will be carried out using exclusively this method will begin in the next period.


13

Ing. Veronika Kramaříková, MBA / Vice-Rector for Development and Strategy

"Everybody needs to develop. A small child develops from the moment it is born, society undergoes changes in times good and bad, and as a result of unexpected events. University is a driver of development in society as a whole and the way it confronts change is fundamental. CTU is a technological leader and it strives to make use of any opportunity to develop in the right direction."

13 Development and strategy

In 2019, a significant number of events took place that, due to their social importance, had a great impact on CTU as one of the important technological institutions in the Czech Republic. The European Commission evaluated its position towards other technological leaders and set up new tools and procedures to enahnce Europe's competitiveness. It is very important that through its steps and development projects CTU fulfils its vision of directing its efforts towards fulfilment of its role of a respected authority in the field of new technologies and actively seeks to set up systems to strengthen this role.

Within the framework of 33 development projects, the individual goals of the long-term plan were fulfilled in all defined areas and certain progress was achieved. All the financial resources in the amount of 77,376,000 CZK were used.

QUALITY ASSURANCE

Quality assurance affects all areas and entities on the CTU campus and within its operations. It is a necessary precondition for institutional accreditation of all study programmes at CTU. In 2019, over 30% of financial resources allocated to institutional projects were used in line with the fulfilment of the priority objective of Quality Assurance. Within this priority, fourteen projects were implemented, which were focused on quality and included the development of the instrumental platform. Within this priority, fourteen projects were implemented, which were aimed at improving network systems in the field of quality and included also the development of the instrumental platform. For instance, at the Faculty of Mechanical Engineering, a laboratory 3D printer, a telemetry set and a high-quality microscope were purchased, to be used by students of FME and other faculties in classes. Financial resources were also used for the expansion, modernization and renewal of equipment to be used in scientific and pedagogical activities. Other financial resources were used for investment in facilities to increase the physical fitness of students and to support students with disabilities. All projects in the framework of this priority had a strong link to cooperation with industry.

DIVERSITY AND AVAILABILITY

Taking care of talented students and supporting students in the first year of their studies who come with different levels of knowledge are two completely different, yet interconnected areas, in which there is great potential for further development of the university. In 2019, two IP projects in these areas were supported, with more efforts to be made in this area in the future.

One of the projects supported in 2019 focused on the evaluation of CTU students with exceptional talent and skills. Special-purpose scholarships are used to motivate them to increase their competencies. All constituent parts of CTU were involved in this project dedicated to students in bachelor and follow-up master study programmes.

The second project aimed to improve the administration of Lifelong Learning (LLL) with regard to the new methodology for the management of courses and the newly created approach to LLL.

INTERNATIONALIZATION

Involvement in international structures and the possibility to get experience from abroad are among the most important areas of development for each employee and for CTU as a whole. Two projects focused on student and staff mobility were supported as part of the fulfilment of the internationalization goals that accounted for nearly 17% of total expenditures under the 2019 Institutional Plan.

The two projects built on the tried and tested model of sending students to partner universities abroad based on

concluded bilateral agreements on student exchange. The deepening of internationalization of life at the university and the increase in the quality of the educational process is also significantly influenced by the work of foreign staff at individual faculties. Under this project, outgoing and incoming staff mobility was supported. The Study in Prague project, supported in the framework of the Centralized Development Projects (CRP) by MŠMT, is also very successful.

RELEVANCE

One project was dedicated to this priority goal with a share of 0.6% of the total amount of financial resources under the 2019 Institutional Plan. The project focused on improving and developing consultancy services at CTU, implemented by the CTU Information and Counsultancy Centre (CIPS). The target group were CTU students, doctoral students participating in instruction and employees of CTU study departments. The activities focused on the prevention of dropping out of university and supporting successful studies and professional careers.

HIGH-QUALITY AND RELEVANT RESEARCH, DEVELOPMENT AND INNOVATION

The participation in the C.E.L.S.A. programme is a regularly supported activity that aims to promote internationalization of science at CTU, in particular by supporting the preparation of international scientific projects. It mainly uses CTU's membership in the international association CELSA (Central Europe Leuven Strategic Alliance) led by the Catholic University of Leuven, Belgium.

DECISION-MAKING BASED ON DATA

A complete and user-accessible data infrastructure is the key for ensuring high quality and evaluation of the proposed measures within strategic management. Its development must respect all requirements for the protection of personal data, together with securing the entire system against external influences. The entire system built on the interconnection and communication of all involved constituent parts requires substantial time and professional and financial involvement. For this reason, nearly 23% of the financial resources of the 2019 Institutional Plan were allocated to to this priority and included a total of 12 subprojects aimed at implementing legislative changes regarding personal data protection (GDPR) or cybersecurity through projects aimed at improving the quality of user environment using API (Application Programming Interface). Another large area of implementation is the development of functionalities in individual applications such as Mobility or the study information system KOS. Another supported project was the implementation of a new version of the CTU Questionnaire system, which will provide feedback on the operation and management of CTU in the future.

The priority goal of Decision-Making Based on Data was also supported in the framework of the 2019 Centralized Development Projects, when in cooperation with other universities, data support for the evaluation of quality indicators of study programmes was carried out and advanced digitization of study and administrative agendas was implemented in the university environment in accordance with new Czech and EU legislation.

EFFECTIVE FINANCING

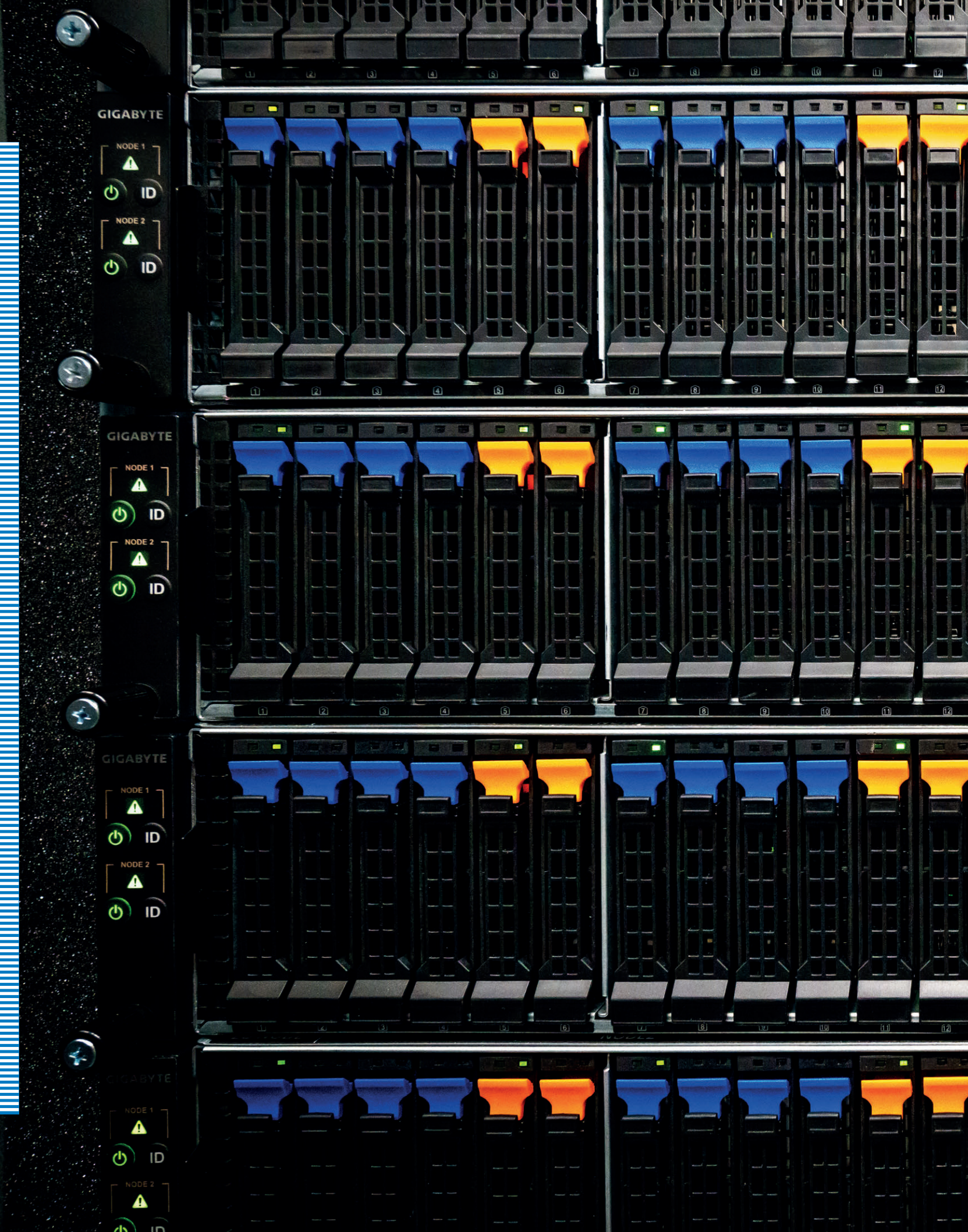
The importance of effective financing is increasing due to the declining financial resources and the need to prepare for the new financial period of the EU operational and community programmes. At the same time, projects need to be prepared and detailed knowledge of the state of the projects is essential. Therefore, in 2019, the project Support for the Passportization of GTFacilties was implemented, which monitors the current state of facilities and serves as a tool for property management and is used in the preparation of the CTU Plan of Development. It must therefore be able to process data entries to various software applications.

Support for the priority of effective financing was also one of the 2019 Centralized Development Projects. A total of 24 universities shared their knowledge on how to use funds from the Operational Programme Research, Development and Education (OP RDE), in the implementation of the HR Award process or the Horizon 2020 international projects. At the same time, the universities also shared experience with the process and demonstration in the subsequent audits of these projects, primarily under the OP RDE programme.

THE FUTURE OF CTU

At the moment, changes and preparations for the next financial period of the European Union are ahead of us, which also entails an assessment of the current goals and tools for the development of Europe as a whole. Science, research, innovation and new technologies are at the centre of attention of all developed countries, which aim to become independent leaders. Therefore, universities must be ready to get involved and participate in defining the new direction. CTU has accepted this trend and has become involved in the support and use of new technologies, such as artificial intelligence and digitization. At the same time, CTU gives a lot of attention to sustainable development, and scientific teams at CTU are pre-eminently focused on water scarcity and efficient construction of buildings, among other things.

In 2020, the current CTU strategic documents will expire. A review must be carried out and new documents prepared that will be based primarily on mutual agreement between all constituent parts of CTU. The main goal should be to strengthen excellence and become part of the technological direction of the Czech Republic together with improving CTU's excellent position at the international level.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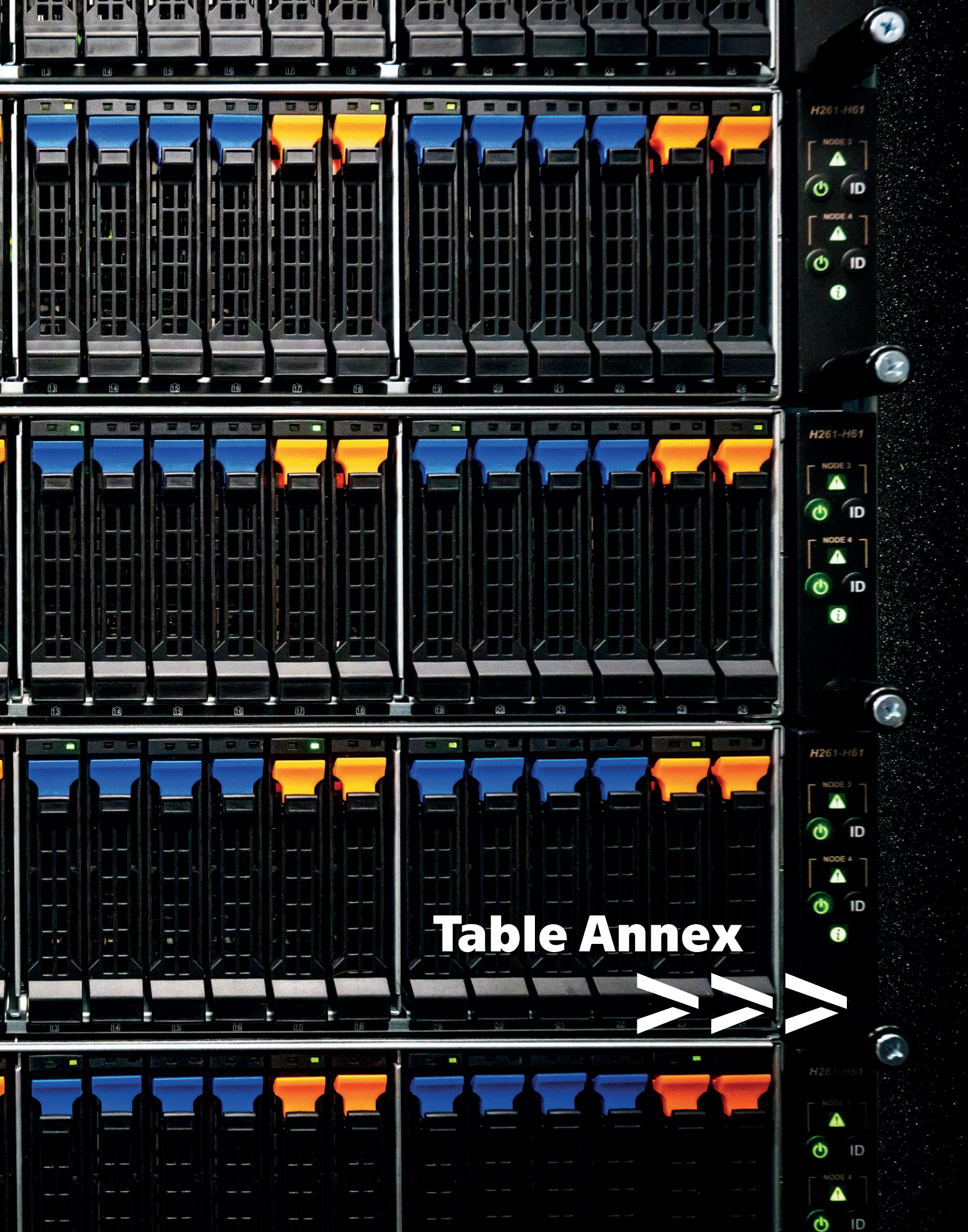


Table Annex

1.1 Basic Facts

FACULTIES

Faculty of Civil Engineering (FCE), Thákurova 7, 166 29 Prague 6

Faculty of Mechanical Engineering (FME), Technická 4, 166 07 Prague 6

Faculty of Electrical Engineering (FEE), Technická 2, 166 27 Prague 6

Faculty of Nuclear Sciences and Physical Engineering (FNSPE), Břehová 7, 115 19 Prague 1
(detached department in Děčín, Pohraniční 1, 405 01 Děčín 1)

Faculty of Architecture (FA), Thákurova 9, 166 34 Prague 6

Faculty of Transportation Sciences (FTS), Konviktská 20, 110 00 Prague 1
(detached Institute for Bachelor Studies in Děčín, Pohraniční 1, 405 01 Děčín 1)

Faculty of Biomedical Engineering (FBME), nám. Sítná 3105, 272 01 Kladno

Faculty of Information Technology (FIT), Thákurova 9, 160 00 Prague 6

UNIVERSITY INSTITUTES

Klokner Institute (KI), Šolínova 7, 166 08 Prague 6

Masaryk Institute of Advanced Studies (MIAS), Kolejní 2637/2a, 160 00 Prague 6

Institute of Physical Education and Sport (ÚTVS), Pod Juliskou 4, 160 00 Prague 6

University Centre for Energy Efficient Buildings (UCEEB), Třinecká 1024, 273 43 Buštěhrad

Czech Institute for Informatics, Robotics and Cybernetics (CIIRC), Jugoslávských partyzánů 1580/3, 160 00 Prague 6

Institute of Experimental and Applied Physics CTU (IEAP), Husova 240/5, 110 00 Staré Město

OTHER CONSTITUENT PARTS OF CTU

Computing and Information Centre (CIC), Jugoslávských partyzánů 1850/3, 160 00 Prague 6

Central Library at CTU (ÚK), Jugoslávských partyzánů 1850/3, 160 00 Prague 6

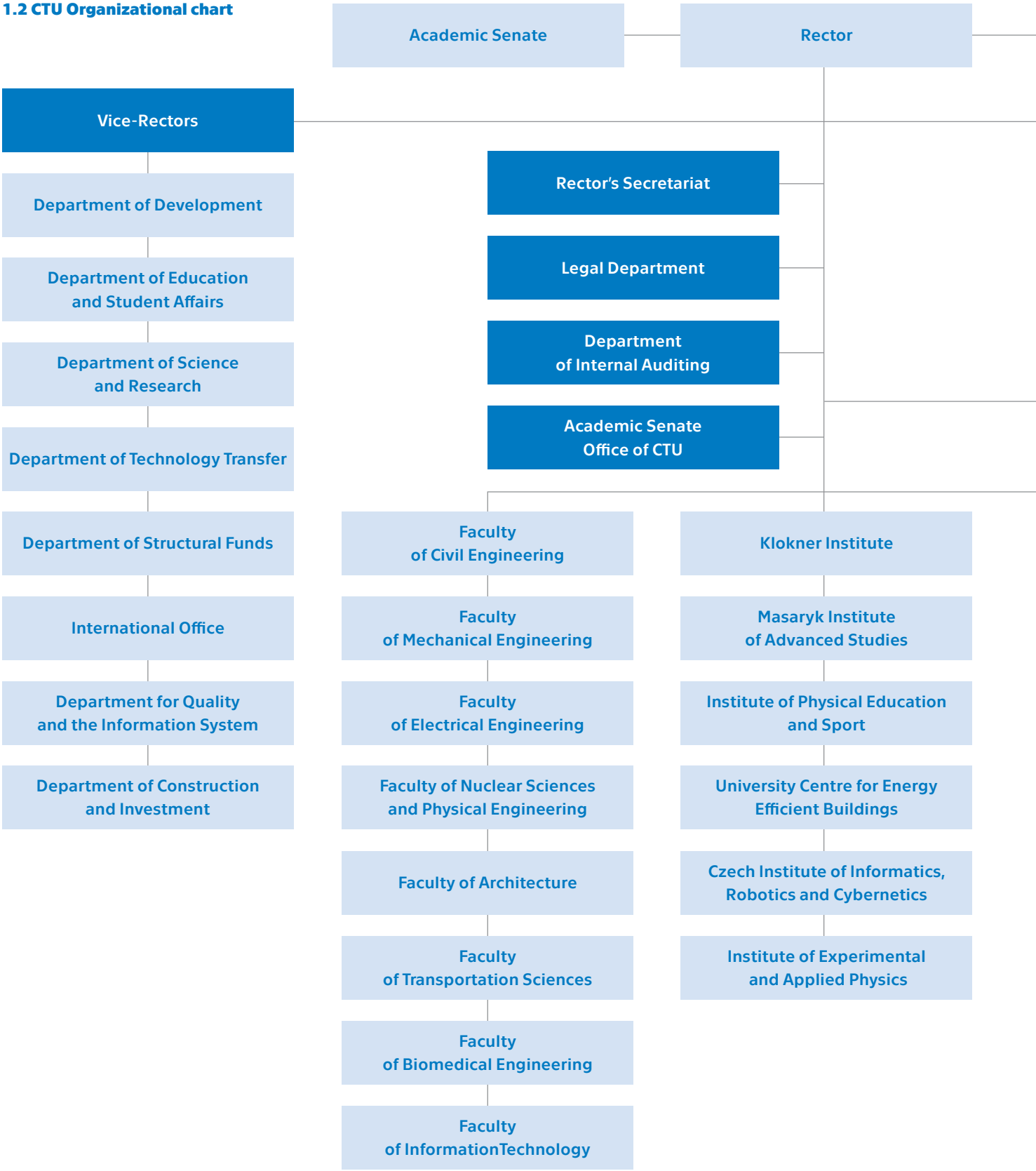
SERVICE FACILITIES

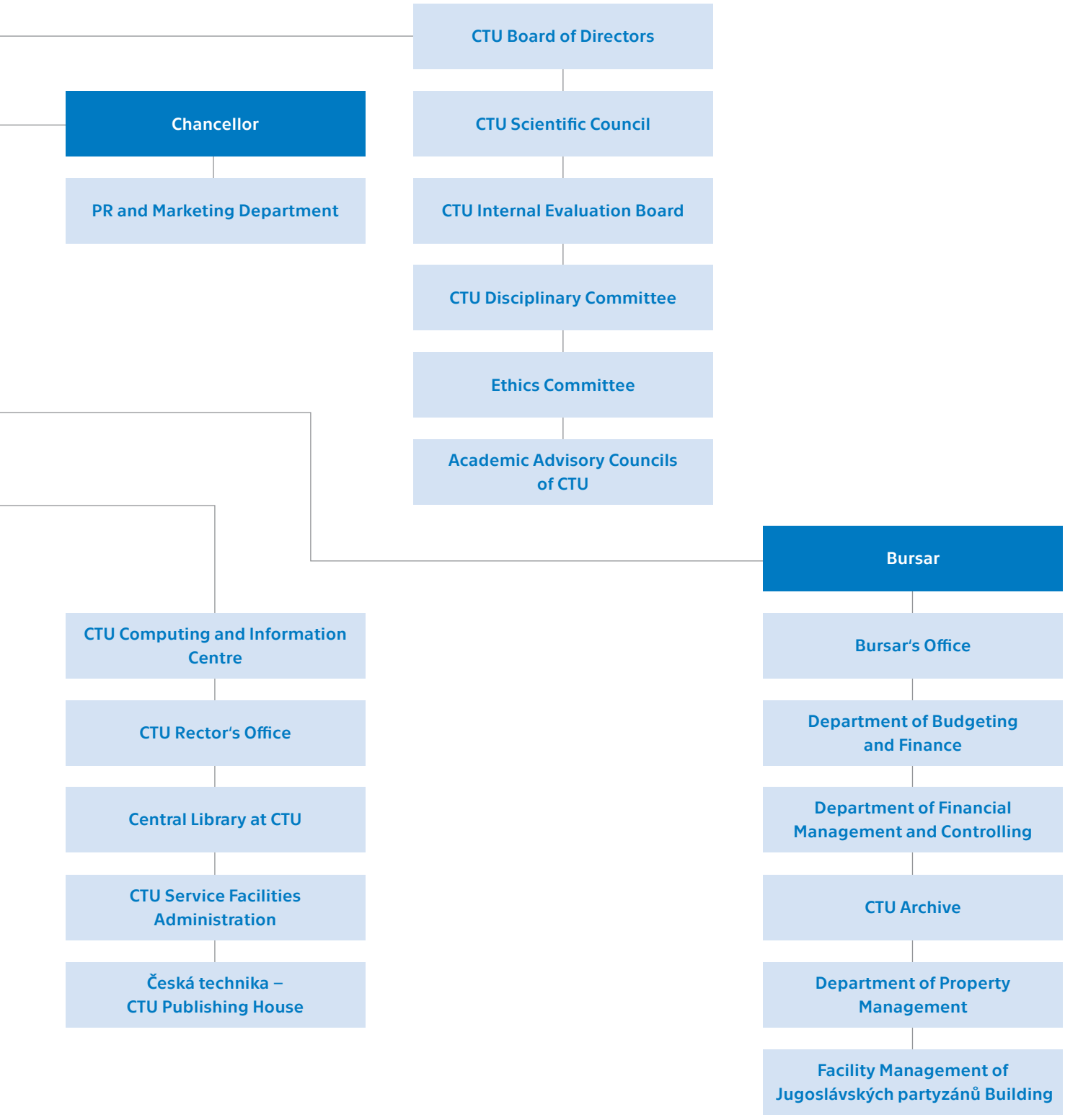
Rector's Office (Rectorate), Jugoslávských partyzánů 1580/3, 160 00 Prague 6

Service Facilities Administration (SÚZ), Vaníčkova 7, 160 17 Praha 6

Česká technika – CTU Publishing House (ČTN), Thákurova 1, 160 41 Praha 6

1.2 CTU Organizational chart




CTU Board of Directors
Chancellor
CTU Scientific Council
PR and Marketing Department
CTU Internal Evaluation Board
CTU Disciplinary Committee
Ethics Committee
Academic Advisory Councils of CTU
Bursar
CTU Computing and Information Centre
Bursar's Office
CTU Rector's Office
Department of Budgeting and Finance
Central Library at CTU
Department of Financial Management and Controlling
CTU Service Facilities Administration
CTU Archive
Česká technika – CTU Publishing House
Department of Property Management
Facility Management of Jugoslávských partyzánů Building

1.3 Academic bodies of CTU

Tab. 1.3.1: CTU management	
Rector	**doc. RNDr. Vojtěch PETRÁČEK, CSc.**
Vice-Rectors	
For Bachelor and Master Studies	**doc. Dr. Ing. Gabriela ACHTENOVÁ**
For Informatics	**Ing. Radek HOLÝ, Ph.D.**
For Development and Strategy	**doc. Ing. arch. Petr KORDOVSKÝ**
For Science, Creative Activities and PhD Studies	**prof. Ing. Zbyněk ŠKVOR, CSc.**
For Construction	**prof. Ing. Alena KOHOUTKOVÁ, CSc.**
For International Relations	**prof. Ing. Zbyněk ŠKVOR, CSc.**
Registrar	**Ing. Jiří BOHÁČEK**
Chair of the CTU Academic Senate	**doc. Ing. Jan JANOUŠEK, Ph.D.**
Chancellor	**Ing. Lucie ORGONÍKOVÁ**

Tab. 1.3.2: CTU Board of Directors		
Chair	**Prof. Ing. Petr SÁHA CSc.** (since 2 December 2019)	Vice-Rector for Research, Development and Creative Activities, Tomáš Baťa University in Zlín
Deputy chairs	**Ing. Dana DRÁBOVÁ, Ph.D.** (since 2 December 2019)	President, State Office for Nuclear Safety
	Mgr. František BUREŠ, MBA, LL.M (since 2 December 2019)	Member of the Board of Directors and Chief Technical Officer, Ukrainian Railways
	Ing. Eduard PALÍŠEK, Ph.D., MBA (till 24 September 2019)	CEO, Siemens, s. r. o.
Members	**Ing. Vladimír DLOUHÝ, CSc.**	President, Chamber of Commerce of the Czech Republic
	Ing. Jaroslav DOLEŽAL, CSc. dr.h.c. (till 24 September 2019)	Consultant, emeritus representative, Honeywell, Czech Republic
	Ing. Petr DVOŘÁK, MBA	General Director, Czech Television
	Ing. arch. Jan FIBIGER, CSc. (since 2 December 2019)	Chair of Board of Directors, Foundation for Development of Architecture and Civil Engineering (ABF)
	Ing. Dan JIRÁNEK (till 24 September 2019)	Executive director, Union of Towns and Municipalities of the Czech Republic, Member of the European Committee of the Regions
	Ing. arch. Jan KASL	Director, Best Development Prague architecture studio
	Mgr. Ondřej KOLÁŘ (since 8 November 2019)	Mayor of Prague 6
	Mgr. Karel KOMÁREK, st. (since 11 October 2019)	Managing Director, Smart Brain, s. r. o.
	Ing. Jaroslav MÍL, MBA (since 2 December 2019)	Government Envoy for Nuclear Energy, Chair of Board of Directors, Elektrárna Temelín II, a.s., and Elektrárna Dukovany II, a.s.
	Ing. Vlastimil PICEK	Mayor, Brandýs nad Labem-Stará Boleslav
	Ing. Jiří RUSNOK	Governor, Czech National Bank
	RNDr. Jiří SLOVÁK	Independent expert in nuclear fuel cycle
	Ing. Michaela ŠOJDROVÁ	MEP, European Parliament
	Mgr. Radek VONDRÁČEK (since 15 May 2019)	President of the Chamber of Deputies of the Parliament of the Czech Republic
Secretary	**Ing. Lucie ORGONÍKOVÁ**	Chancellor, CTU in Prague

Tab. 1.3.3: CTU Scientific Council

Chair	**doc. RNDr. Vojtěch PETRÁČEK, CSc.**	FNSPE, CTU Rector
Internal members	**prof. Ing. Petr HÁJEK, CSc.**	FCE
	prof. Ing. Jiří MÁCA, CSc.	FCE, Dean
	prof. Ing. František WALD, CSc.	FCE
	prof. Ing. Tomáš JIROUT, Ph.D.	FME
	prof. Ing. Jan MACEK, DrSc.	FME
	prof. Ing. Michael VALÁŠEK, DrSc.	FME, Dean
	prof. Ing. Jiří MATAS, Ph.D.	FEE
	prof. Ing. Pavel RIPKA, CSc.	FEE, Dean
	prof. Ing. Zbyněk ŠKVOR, CSc.	FEE, Vice-Rector for Science, Creative Activities and PhD Studies
	prof. Ing. Hana JELÍNKOVÁ, DrSc.	FNSPE
	prof. Ing. Igor JEX, DrSc.	FNSPE, Dean
	prof. Ing. arch. Ladislav LÁBUS, Hon. FAIA	FA, Dean
	doc. Dr. Ing. Martin POSPÍŠIL, Ph.D.	FA
	prof. Ing. arch. Zdeněk ZAVŘEL, dr. h. c.	FA
	doc. Ing. Pavel HRUBEŠ, Ph.D.	FTS, Dean
	prof. Ing. Ondřej JIROUŠEK, Ph.D.	FTS
	doc. Ing. Jaroslav MACHAN, CSc.	FTS
	prof. MUDr. Ivan DYLEVSKÝ, DrSc.	FBME, Dean
	prof. MUDr. Leoš NAVRÁTIL, CSc., MBA	FBME
	doc. RNDr. Ing. Marcel JIŘINA, Ph.D.	FIT, Dean
	doc. Ing. Hana KUBÁTOVÁ, CSc.	FIT
	prof. Ing. Pavel TVRDÍK, CSc.	FIT
	prof. Dr. Ing. Zdeněk HANZÁLEK	
External members	**prof. RNDr. Miroslav DOUPOVEC, CSc., dr. h. c.,**	Brno University of Technology
	Ing. Dana DRÁBOVÁ, Ph.D., dr. h. c.	President, State Office for Nuclear Safety,
	prof. Ing. Rostislav DROCHYTKA, CSc., MBA	Brno University of Technology
	prof. Ing. Jiří HOMOLA, CSc., DrSc.	Institute of Photonics and Electronics, CAS
	prof. RNDr. Jan KRATOCHVÍL, DSc.	Faculty of Mathematics and Physics, Charles University in Prague, Dean
	Dr. František KRAUS, Dr. Sc., Wiss Adjunkt	ETH Zürich
	prof. Ing. Alois MATERNA, CSc., MBA	VŠB – TU Ostrava
	prof. Ing. Petr NOSKIEVIČ, CSc.	VŠB – TU Ostrava
	prof. Ing. Ivo PROVAZNÍK, Ph.D.	Brno University of Technology
	prof. Ing. arch. Jaroslav ŠAFER	Czech Chamber of Architects
	doc. Ing. Libor ŠVADLENKA, Ph.D.	Faculty of Transport Engineering, University of Pardubice, Dean
	prof. Dr. Ing. Pavel ZEMČÍK	Brno University of Technology

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Tab. 1.3.3: CTU Scientific Council

Extraordinary members	**prof. Dr. ir. Henri Hubertus ACHTEN**	FA
	prof. Ing. Zdeněk BITTNAR, DrSc.	FCE
	prof. Dr. Ing. Vladimír BLAŽEK	RWTH Aachen
	doc. PaedDr. Jiří DRNEK, CSc.	ÚTVS, Director
	doc. Ing. Lukáš FERKL, Ph.D.	UCEEB, Director
	prof. Ing. František HRDLIČKA, CSc.	FME
	prof. Ing. Stanislava HRONOVÁ, CSc.	University of Economics, Prague
	doc. Ing. Jiří KOLÍSKO, Ph.D.	KI, Director
	prof. RNDr. Bohumil KRATOCHVÍL, DSc.	University of Chemistry and Technology in Prague
	prof. Ing. Karel MELZOCH, CSc.	University of Chemistry and Technology in Prague
	RNDr. Michael PROUZA, Ph.D.	Institute of Physics, CAS
	prof. RNDr. Karel ŠAFAŘÍK, CSc.	FNSPE
	doc. Ing. Ivan ŠTEKL, CSc.	IEAP, Director
	doc. Ing. Lenka ŠVECOVÁ, Ph.D.	MIAS, Director
	prof. Ing. Petr KONVALINKA, CSc., FEng.	FCE, Emeritus Rector
	prof. Ing. Václav HAVLÍČEK, CSc.	FEE, Emeritus Rector
	prof. Ing. Jiří WITZANY, DrSc.	FCE, Emeritus Rector
	prof. Ing. Petr ZUNA, CSc., D.Eng. h. c., FEng.	FME, Emeritus Rector

Tab. 1.3.4: CTU Academic Senate		
Chairman	**doc. Ing. Jan JANOUŠEK, Ph.D.**	FIT
Vice-Chairman (staff)	**Ing. arch. Dana MATĚJOVSKÁ, Ph.D.**	FA
Vice-Chairman (student)	**Ing. Michal FARNÍK**	FNSPE (since 30 January 2019)
Chairman of Legislative Committee	**RNDr. Petr OLŠÁK**	FEE
Head Chairman of Economic Committee	**prof. Ing. František HRDLIČKA, CSc.**	FME
Chairman of Committee for Development and Quality	**prof. Ing. Václav HLAVÁČ, CSc.**	CIIRC
Chairman of Education Committee	**RNDr. Jiří ŠRUBAŘ, Ph.D.**	FA
Chairman of SF Committee	**Ing. Tomáš DRÁBEK**	FEE
Chairman of Students' Committee	**Bc. Jozef ŠEBÁK**	MIAS (since 30 January 2019)
	Ing. Michal FARNÍK	FNSPE (1 January 2019 – 29 January 2019)
Chairman of Committee for IT Strategy	**prof. Dr. Ing. Jan KYBIC**	FEE
Chairman of Committee for Science, Creative Activities and Doctoral Study	**doc. Dr. Ing. Ivan RICHTER**	FNSPE
Members of Academic Senate	**prof. Ing. Zdeněk BITTNAR, DrSc.**	FCE
	Ing. arch. Robert BOUŠKA	FCE
	doc. Ing. Jiří CAJTHAML, Ph.D.	FCE
	Ing. Michal MÁRA	FCE
	prof. Ing. Jan TYWONIAK, CSc.	FCE
	doc. Ing. Václav BAUMA, CSc.	FME
	prof. Ing. František HRDLIČKA, CSc.	FME, Chairman of Economic Committee, AS CTU
	prof. Ing. Jiří NOŽIČKA, CSc.	FME
	Ing. Kryštof ŠULC	FME
	Ing. Jiří VOLECH	FME
	Bc. Jakub BEGERA	FEE (till 30 January 2019)
	RNDr. Ilona Ali BLÁHOVÁ, Ph.D.	FEE
	Ing. Tomáš DRÁBEK	FEE, Chairman of SF Committee, AS CTU
	prof. Dr. Ing. Jan KYBIC	FEE, Chairman of Committee for IT Strategy, AS CTU
	RNDr. Petr OLŠÁK	FEE, Chairman of Legislative Committee, AS CTU
	Ing. Michal FARNÍK	FNSPE, Vice-Chairman, AS CTU
	Ing. Kateřina CHYTRÁ	FNSPE
	doc. Ing. Jiří MIKYŠKA, Ph.D.	FNSPE
	doc. Ing. Petr PRŮŠA, Ph.D.	FNSPE (since 4 September 2018)
	doc. Dr. Ing. Ivan RICHTER	FNSPE, Chairman of Committee for Science, Creative Activities and Doctoral Study, AS CTU
	Bc. Josef HOLEČEK	FA
	doc. Ing. arch. Dalibor HLAVÁČEK, Ph.D.	FA
	Ing. arch. Dana MATĚJOVSKÁ, Ph.D.	FA, Vice-Chairwoman, AS CTU
	RNDr. Jiří ŠRUBAŘ, Ph.D.	FA, Chairman of Education Committee, AS CTU

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Tab. 1.3.4: CTU Academic Senate

Members of Academic Senate	**Bc. Marek WAGNER**	FA
	Ing. Bc. Vladimír FALTUS, Ph.D.	FTS
	Ing. Mgr. Jan FEIT	FTS
	Ing. Tomáš DOKTOR	FTS
	Ing. Šárka HULÍNSKÁ	FTS (till 30 April 2019)
	Bc. Micahl ŠUPEJ	FTS
	Mgr. Pavel BÖHM, MBA	FBME
	Ing. Yulia ČUPROVÁ, Ph.D.	FBME
	Ing. Jan KAŠPAR	FBME
	Ing. Tomáš POKORNÝ	FBME
	Mgr. Veronika VYMĚTALOVÁ, Ph.D.	FBME
	PhDr. Ing. Tomáš EVAN, Ph.D.	FIT (since 1 June 2019)
	Ing. Magda FRIEDJUNGOVÁ	FIT
	doc. Ing. Jan JANOUŠEK, Ph.D.	FIT, Chairman, AS CTU
	Ing. Stanislav JEŘÁBEK	FIT
	Ing. Zdeněk MUZIKÁŘ, CSc.	FIT (till 31 May 2019)
	Ing. Radomír POLÁCH	FIT
	prof. Ing. Václav HLAVÁČ, CSc.	CIIRC, Chairman of Committee for Development and Quality, AS CTU
	Ing. David ČÍTEK	KI
	Ing. Bc. Pavel ANDRES, Ph.D., ING.PAED.IGIP	MIAS
	Bc. Jozef ŠEBÁK	MIAS, Chairman of the Student's Committee, AS CTU
	PhDr. Jaroslav SCHMID, CSc.	ÚTVS

Tab. 1.3.5: CTU Disciplinary Commission	
Chair	**Ing. Petr TEJ, Ph.D.** (KI)
Members of the Commission	
Academic workers	**doc. Ing. Petr BOUŠKA, CSc.** (KI)
	doc. Ing. Vít POŠTA, Ph.D. (MIAS)
	doc. Ing. Martin ZRALÝ, CSc. (MIAS)
Students	**Ing. Martin KRYŠTOV** (KI)
	Anna POŽÁROVÁ (MIAS)
	Jakub ŠTOREK (MIAS)
Substitute Members	
Academic workers	**Ing. Dagmar ČÁMSKÁ, Ph.D.** (MIAS)
	Ing. Petr TEJ, Ph.D. (KI)
Students	**Bc. Veronika KOUTNÍKOVÁ** (MIAS)
	Ing. Lucie VOŠAHLÍKOVÁ (KI)

Tab. 1.3.6: Ethical Commission	
Chair	**prof. Ing. Jan UHLÍŘ, CSc.** (FEE)
Members of the Commission	**prof. Ing. Miloslav HAVLÍČEK, DrSc.** (FNSPE)
	prof. Ing. Jan HOLUB, Ph.D. (FIT)
	doc. Ing. Jitka VAŠKOVÁ, CSc. (FCE)

Tab. 1.3.7: CTU Internal Evaluation Board	
Chair	**doc. RNDr. Vojtěch PETRÁČEK, CSc.** (FNSPE, CTU Rector)
Vice-chair	**prof. Ing. Petr HÁJEK, CSc.** (FCE)
Members	**doc. Ing. Miroslav ČECH, CSc.** (FNSPE)
	prof. Ing. František HRDLIČKA, CSc. (FME)
	doc. Ing. Jiří JAKOVENKO, Ph.D. (FEE)
	doc. Ing. Jan JANOUŠEK, Ph.D. (FIT)
	prof. Ing. Josef JÍRA, CSc. (FTS)
	prof. RNDr. Bohumil KRATOCHVÍL, DrSc. (UCT) (since 19 June 2019)
	prof. Ing. Vladimír KUČERA, DrSc., dr. h. c. (CIIRC)
	prof. Ing. Jan MACEK, DrSc. (FME)
	doc. Ing. Daniel MÜNICH, Ph.D. (FEE)
	doc. Ing. Antonín POKORNÝ, CSc. (FA)
	prof. MUDr. Jozef ROSINA, Ph.D., MBA (FBME)
	Ing. Tomáš SMEJKAL (FNSPE)
	prof. Ing. Pavel TVRDÍK, CSc. (FIT)
Clerk	**Ing. Bc. Josef SVOBODA, Ph.D.**

1.4 CTU presence in the representation of Czech universities

Czech Rectors' Conference
CTU Rector, doc. RNDr. Vojtěch PETRÁČEK, CSc.

CTU delegates at the Council of Universities
Presidium of the Council of Universities
Ing. Michal FARNÍK, CTU
RNDr. Petr OLŠÁK, CTU

Members of the Assembly of the Council of Universities	**Delegated by**
RNDr. Petr OLŠÁK	CTU
doc. Ing. Jiří CAJTHAML, Ph.D.	CTU
prof. Ing. arch. Michal KOHOUT	Faculty of Architecture
prof. MUDr. Leoš NAVRÁTIL, CSc.	Faculty of Biomedical Engineering
Ing. Jakub HOSPODKA, Ph.D.	Faculty of Transportation Sciences
doc. Ing. Hana KUBÁTOVÁ, CSc.	Faculty of Information Technology
doc. Mgr. Milan KRBÁLEK, Ph.D.	Faculty of Nuclear Sciences and Physical Engineering
prof. Ing. Michal POLÁK, CSc.	Faculty of Civil Engineering
prof. Ing. Zbyněk ŠIKA, Ph.D.	Faculty of Mechanical Engineering

Working Legislative Committee
Bc. Barbora KULTOVÁ
RNDr. Petr OLŠÁK

Working Economic Committee
doc. Ing. Jiří CAJTHAML, Ph.D.

Working Committee for Educational Activities
doc. Ing. Jiří CAJTHAML, Ph.D.

Working Committee for Scientific Activities
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doc. Mgr. Milan KRBÁLEK, Ph.D.
prof. MUDr. Leoš NAVRÁTIL, CSc.
prof. Ing. Michal POLÁK, CSc.
prof. Ing. Zbyněk ŠIKA, Ph.D.

Working Committee for Strategy and Development of Higher Education
Bc. Barbora KULTOVÁ

Working Committee for Quality Assessment of Universities
prof. Ing. arch. Michal KOHOUT
doc. Ing. Hana KUBÁTOVÁ, CSc.
prof. MUDr. Leoš NAVRÁTIL, CSc., MBA

Working Committee for External and International Relations
doc. Jakub HOSPODKA, Ph.D

Student Chamber of the Council of Universities
Ing. Michal FARNÍK, delegate
Bc. Barbora KULTOVÁ, substitute delegate

Tab. 2.1: Accredited study programmes (number)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Faculty of Civil Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	8				8		13	7	36
Faculty total	**X**	**8**				**8**		**13**	**7**	**36**
Faculty of Mechanical Engineering*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06					1	1			2
Engineering, manufacturing and statistics	07	3	3			10	6	1	1	24
Faculty total	**X**	**3**	**3**			**11**	**7**	**1**	**1**	**26**
Faculty of Electrical Engineering*										
Broad fields of education in ISCED-F	code									
Business, administration and law	04							1	1	2
Natural sciences, mathematics and atatistics	05							1		1
Information and Communication Technologies	06	3	1			3		4		11
Engineering, manufacturing and statistics	07	9	1			13	2	5	3	33
Faculty total	**X**	**12**	**2**			**16**	**2**	**11**	**4**	**47**
Faculty of Nuclear Sciences and Physical Engineering*										
Broad fields of education in ISCED-F	code									
Natural sciences, mathematics and atatistics	05	1				1		1	1	4
Information and Communication Technologies	06					1				1
Engineering, manufacturing and statistics	07							1	1	2
Health and welfare	09	1								1
Faculty total	**X**	**2**				**2**		**2**	**2**	**8**
Faculty of Architecture*										
Broad fields of education in ISCED-F	code									
Arts and humanities	02	2				2		1	1	6
Engineering, manufacturing and statistics	07	3				2		1	1	7
Faculty total	**X**	**5**				**4**		**2**	**2**	**13**
Faculty of Transportation Sciences*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07							1	1	2
Services	10	1	1			1	1	1	2	7
Faculty total	**X**	**1**	**1**			**1**	**1**	**2**	**3**	**9**

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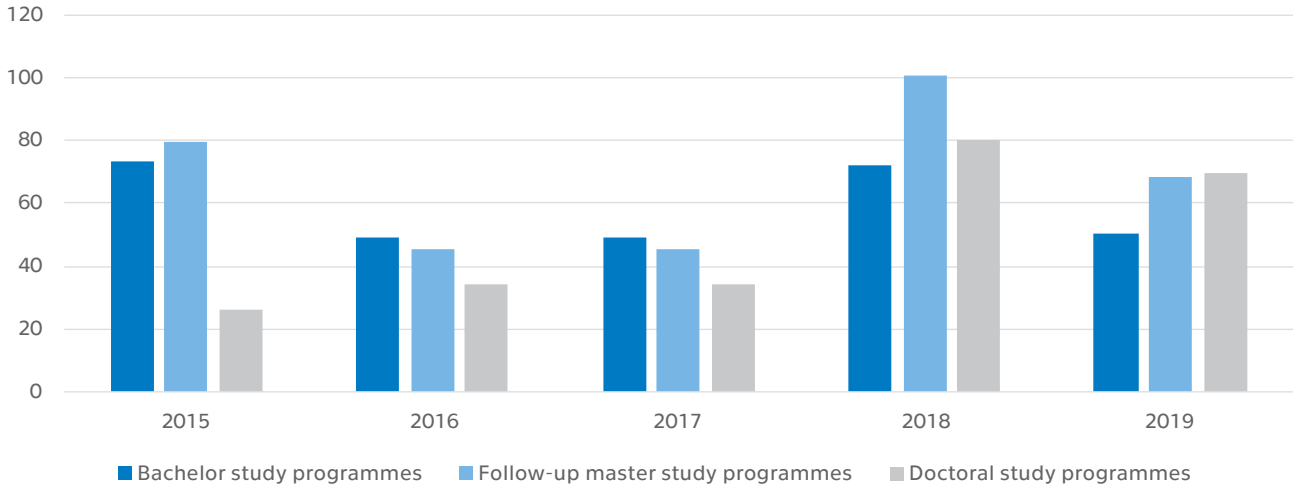
Tab. 2.1: Accredited study programmes (number)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Faculty of Biochemical Engineering*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06					1	0	1	1	3
Engineering, manufacturing and statistics	07	1	1			1	1	1	1	6
Health and welfare	09	2				2	1	1	1	7
Services	10	1	1			2	2	1	2	9
Faculty total	**X**	**4**	**2**			**6**	**4**	**4**	**5**	**25**
Faculty of Information Technology*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06	1	1			2		2	3	9
Faculty total	**X**	**1**	**1**			**2**		**2**	**3**	**9**
University institutes (studies outside faculties)*										
Broad fields of education in ISCED-F	code									
Education	01	1	1							2
Arts and humanities	02							1	1	2
Business, administration and law	04	3				3	1	1	1	9
Engineering, manufacturing and statistics	07							1	1	2
Total	**X**	**4**	**1**			**3**	**1**	**3**	**3**	**15**
CTU in Prague										
Broad fields of education in ISCED-F	code									
Education	01	1	1							2
Arts and humanities	02	2				2		2	2	8
Business, administration and law	04	3				3	1	2	2	11
Natural sciences, mathematics and atatistics	05	1				1		2	1	5
Information and Communication Technologies	06	4	2			8	1	7	4	26
Engineering, manufacturing and statistics	07	24	5			34	9	24	16	112
Health and welfare	09	3				2	1	1	1	8
Services	10	2	2			3	3	2	4	16
CTU TOTAL	**X**	**40**	**10**			**53**	**15**	**40**	**30**	**188**

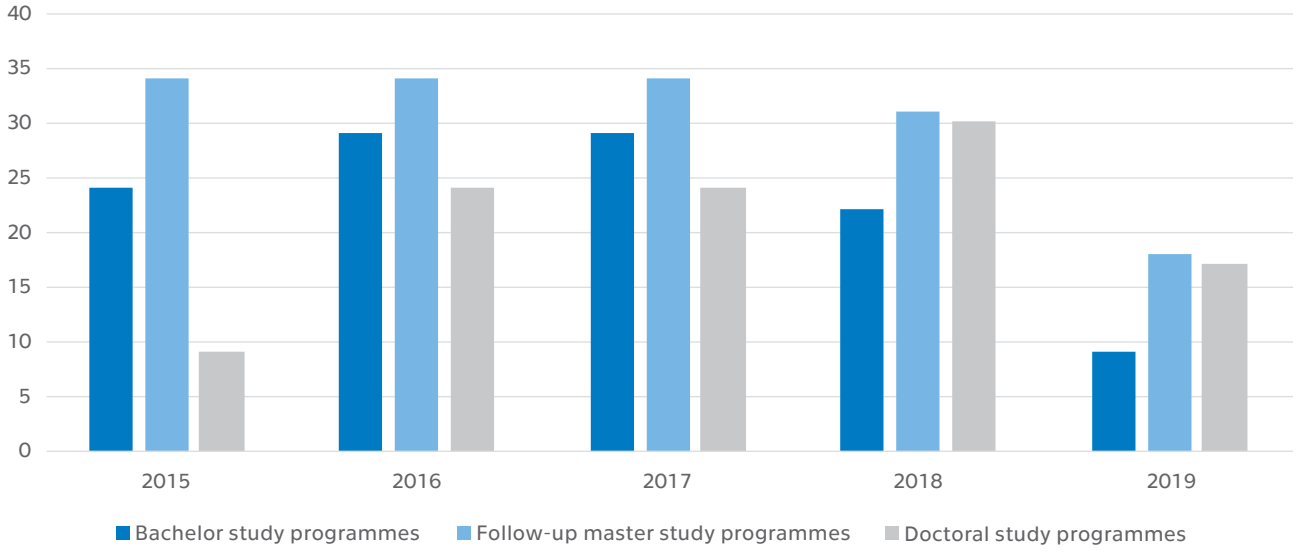
Note: * The faculty or the constituent part of the university implement an accredited study programme

P = full-time study
K/D = part-time/distance study

ACCREDITED STUDY PROGRAMMES (NUMBER) – Bc., NMgr., Ph.D.



STUDY PROGRAMMES IN A FOREIGN LANGUAGE (NUMBER)



Tab. 2.2: Study programmes in a foreign language (number)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Faculty of Civil Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	1				1		4	1	7
Faculty total	**X**	**1**				**1**		**4**	**1**	**7**
Faculty of Mechanical Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	2				2		1		5
Faculty total	**X**	**2**				**2**		**1**		**5**
Faculty of Electrical Engineering*										
Broad fields of education in ISCED-F	code									
Business, administration and law	04								1	1
Natural sciences, mathematics and atatistics	05							1		1
Information and Communication Technologies	06					2		2		4
Engineering, manufacturing and statistics	07	2				6		1	1	10
Faculty total	**X**	**2**				**8**		**4**	**2**	**16**
Faculty of Nuclear Sciences and Physical Engineering*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06					1				1
Engineering, manufacturing and statistics	07							1	1	2
Faculty total	**X**					**1**		**1**	**1**	**3**
Faculty of Architecture*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07					1		1	1	3
Faculty total	**X**					**1**		**1**	**1**	**3**
Faculty of Transportation Sciences*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	1				1				2
Faculty total	**X**	**1**				**1**				**2**
Faculty of Biochemical Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	1				1				2
Health and welfare	09					1				1
Faculty total	**X**	**1**				**2**				**3**
Faculty of Information Technology*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06	1				1			1	3
Faculty total	**X**	**1**				**1**			**1**	**3**

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Tab. 2.2: Study programmes in a foreign language (number)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
University institutes (studies outside faculties)*										
Broad fields of education in ISCED-F	code									
Business, administration and law	04	1				1				2
Total	**X**	**1**				**1**				**2**
CTU in Prague										
Broad fields of education in ISCED-F	code									
Business, administration and law	04	1				1			1	3
Natural sciences, mathematics and atatistics	05							1		1
Information and Communication Technologies	06	1				4		2	1	8
Engineering, manufacturing and statistics	07	7				12		8	4	31
Health and welfare	09					1				1
CTU TOTAL	**X**	**9**				**18**		**11**	**6**	**44**

Note: * The faculty or the constituent part of the university implement an accredited study programme

P = full-time study
K/D = part-time/distance study

Tab. 2.3: Joint/Double/Multiple Degree study programmes implemented with foreign universities	
CTU in Prague	
Faculty of Civil Engineering – programme 1	**Study programme in Civil Engineering, Advanced Master s in Structural Analysis of Monuments and Historical Constructions**
Partner organizations	University of Minho, Portugal Technical University of Catalonia, Spain University of Padova, Italy
Affiliated organizations	Institute of Theoretical and Applied Mechanics, CAS
Category of programme (Joint/Double/Multiple Degree)	Multiple Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**12**
Faculty of Civil Engineering – programme 2	**Study programme in Civil Engineering, Double Degree Master Programme in Civil Engineering**
Partner organizations	École Nationale Des Ponts et Chaussées (ENPC), France
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**1**
Faculty of Civil Engineering – programme 3	**Study programme in Civil Engineering, Double Degree Master Programme in Civil Engineering**
Partner organizations	Technische Universität München, Germany Fakultät für Bauingenieur- und Vermessungswesen, Germany
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**0**
Faculty of Civil Engineering – programme 4	**Study programme in Civil Engineering, Double degree Master Programme in Civil Engineering**
Partner organizations	École Centrale de Nantes, France
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**0**

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Tab. 2.3: Joint/Double/Multiple Degree study programmes implemented with foreign universities	
CTU in Prague	
Faculty of Civil Engineering – programme 5	**Study programme in Civil Engineering, Sustainable Constructions under Natural Hazard and Catastrophic Events**
Partner organizations	University of Coimbra (UC), Portugal Luleå University of Technology (LTU), Sweden Politehnica University of Timisoara (PUT), Romania University of Liège (Ulg), Belgium University of Naples Federico II, Italy
Affiliated organizations	Universidade do Estado do Rio de Janeiro, Brazil Moscow State University of Civil Engineering, Russian Federation ArcelorMittal Global R&D, Luxembourg European Convention for Constructional Steelwork, Belgium Donbas National Academy of Civil Engineering and Architecture, Ukrajina Tongji University, China Kyrgyz State University of Construction, Transport and Architecture, Kyrgyzstan Univerza v Ljubljani, Slovenia Associação Portuguesa de Construção Metálica e Mista, Portugal University of Mosul, Iraq
Category of programme (Joint/Double/Multiple Degree)	Multiple Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**0**
Faculty of Civil Engineering – programme 6	**Stavební inženýrství, Double Degree Master Programme in Civil Engineering**
Partner organizations	KTH Royal Institute of Technology, Stockholm, Sweden
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**1**
Faculty of Civil Engineering – programme 7	**Study programme in Civil Engineering, Double degree Master Programme in Civil Engineering**
Partner organizations	RWTH Aachen, Aachen, Germany, Faculty of Civil Engeneering
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**4**
Faculty of Mechanical Engineering – programme 1	**Master of Automotive Engineering**
Partner organizations	Ensta Bretagne, France, TU Chemnitz, Germany, IT Bandung, Indonasia, HAN, Netherlands
Affiliated organizations	IFP, France
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**56**

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Tab. 2.3: Joint/Double/Multiple Degree study programmes implemented with foreign universities	
CTU in Prague	
Faculty of Electrical Engineering – programme 1	**Erasmus Mundus Master Course – Joint European Master in Space Science and Technology (SpaceMaster)**
Partner organizations	Luleå University of Technology (LTU), Sweden Julius-Maximilian's University of Würzburg (JMUW), Germany Cranfield University (CU), United Kingdom Aalto University (Aalto), Finland Université Paul Sabatier Toulouse III (UPS), France University of Tokyo (Todai), Japan Utah State University (USU), USA
Affiliated organizations	Swedish Institute of Space Physics (IRF), Sweden Swedish Space Corporation (SSC), Sweden European Incoherent Scatter Scientific Association(EISCAT), Norway Honeywell s.r.o. (Honeywell), Czech Republic European Aeronautics Defence and Space Company, Innovation Works Division (EADS), France
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**13**
Faculty of Electrical Engineering – programme 2	**Power Generation and Transportation**
Partner organizations	Tomsk Polytechnic University (TPU), Russian Federation
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**16**
Faculty of Electrical Engineering – programme 3	**Double degree programme with the National Taiwan University of Science and Technology**
Partner organizations	National Taiwan University of Science and Technology), DECE (Department of Electronic and Computer Engineering
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**2**
Faculty of Electrical Engineering – programme 4	**Double degree s RWTH Aachen**
Partner organizations	RWTH Aachen
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**1**

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Tab. 2.3: Joint/Double/Multiple Degree study programmes implemented with foreign universities	
CTU in Prague	
Faculty of Electrical Engineering – programme 5	**Double degree with thes Kazan Federal University**
Partner organizations	Kazan Federal University
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**7**
Faculty of Electrical Engineering – programme 6	Double degree program EURECOM, Francee
Partner organizations	Graduate School and Research Center in Digital Sciences, BIOT, Sophia Antipolis, France
Affiliated organizations	Mobile Computing Systems
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**4**
Faculty of Nuclear Sciences and Physical Engineering – programme 1	**Nuclear Engineering**
Partner organizations	Ghent University
Affiliated organizations	IPP CAS
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Doctoral
Number of active studies as of 31 December	**0**
Faculty of Nuclear Sciences and Physical Engineering – programme 2	**Mathematical Engineering**
Partner organizations	Kanazawa University
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**0**
Faculty of Transportations Sciences	**Technology in Transportation and Telecommunications**
Partner organizations	Linköpings universitet, Sweden UAS Fachhochschule Technikum Wien, Austria
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Joint Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**7**

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Tab. 2.3: Joint/Double/Multiple Degree study programmes implemented with foreign universities	
CTU in Prague	
Faculty of Biomedical Engineering	**CEMACUBE – Common European MAster's CoUrse in Biomedical Engineering (Erasmus Mundus)**
Partner organizations	RWTH Aachen, Germany Ghent University, Belgium Free University of Brussels (VUB), Belgium Trinity College Dublin, Ireland University Groningen, Netherlands (coordinator)
Affiliated organizations	ETH Zürich, Switzerland University of Calabria, Italy Aalborg University, Denmark Université de Technologie Compiègne, France University of Strathclyde, United Kingdom University of Patras, Greece Technical University of Warsaw, Poland
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**3**
Masaryk Institute of Advanced Studies – programme 1	**Economics and Management**
Partner organizations	Wuhan University of Technology (WUT)
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Bachelor
Number of active studies as of 31 December	**0**
Masaryk Institute of Advanced Studies – programme 2	**Innovation Project Management**
Partner organizations	Wuhan University of Technology (WUT)
Affiliated organizations	None
Category of programme (Joint/Double/Multiple Degree)	Double Degree
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**0**

Summary information – tab. 2.3

CTU in Prague	Bachelor study programmes	Master study programmes	Follow-up master study programmes	Doctoral study programmes	Total
Number of study programmes	1	0	18	1	20
Number of active studies in the study programmes	0	0	127	0	127

Tab. 2.4: Accredited study programmes organized jointly with another university or public research institution* based in CR	
CTU in Prague	
Faculty of Mechanical Engineering – programme 1	**Mechatronics**
Broad fields of education in ISCED-F	**0714**
Partner university/institution*	University of South Bohemia in České Budějovice
Type of programme (bachelor, follow-up master, master, doctoral)	Bachelor
Number of active studies as of 31 December	**0**
Faculty of Electrical Engineering – programme 1	**Biomedical Engineering and Informatics**
Broad fields of education in ISCED-F	**0688**
Partner university	Charles University – 1st Faculty of Medicine
Type of programme (bachelor, follow-up master, master, doctoral)	Follow-up master
Number of active studies as of 31 December	**20**
Faculty of Nuclear Sciences and Physical Engineering – programme 1	**Mathematical Engineering**
Broad fields of education in ISCED-F	**0541**
Partner university/institution*	CAS
Type of programme (bachelor, follow-up master, master, doctoral)	Doctoral
Number of active studies as of 31 December	**17**
Faculty of Nuclear Sciences and Physical Engineering – programme 2	**Mathematical Engineering**
Broad fields of education in ISCED-F	**0541**
Partner university/institution*	CAS
Type of programme (bachelor, follow-up master, master, doctoral)	Doctoral
Number of active studies as of 31 December	**7**
Faculty of Nuclear Sciences and Physical Engineering – programme 3	**Physical Engineering**
Broad fields of education in ISCED-F	**0533**
Partner university/institution*	CAS
Type of programme (bachelor, follow-up master, master, doctoral)	Doctoral
Number of active studies as of 31 December	**29**
Faculty of Nuclear Sciences and Physical Engineering – programme 4	**Nuclear Engineering**
Broad fields of education in ISCED-F	**0588**
Partner university/institution*	CAS
Type of programme (bachelor, follow-up master, master, doctoral)	Doctoral
Number of active studies as of 31 December	**23**
Faculty of Nuclear Sciences and Physical Engineering – programme 5	**Nuclear Chemistry**
Broad fields of education in ISCED-F	**0531**
Partner university/institution*	CAS
Type of programme (bachelor, follow-up master, master, doctoral)	Doctoral
Number of active studies as of 31 December	**9**
Faculty of Nuclear Sciences and Physical Engineering – programme 6	**Radiologal Physics**
Broad fields of education in ISCED-F	**0533**
Partner university/institution*	CAS
Type of programme (bachelor, follow-up master, master, doctoral)	Doctoral
Number of active studies as of 31 December	**4**

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Tab. 2.4: Accredited study programmes organized jointly with another university or public research institution* based in CR	
CTU in Prague	
Faculty of Architecture	**Landscape Architecture**
Broad fields of education in ISCED-F	**0731**
Partner university/institution*	Czech University of Life Sciences
Type of programme (bachelor, follow-up master, master, doctoral)	Bachelor
Number of active studies as of 31 December	**1**

Note: * They are, for example, accredited study programmes organized together with the Czech Academy of Sciences or with other public research institutions based in CR.

Summary information – tab. 2.4					
CTU in Prague	**Bachelor study programmes**	**Master study programmes**	**Follow-up master study programmes**	**Doctoral study programmes**	**Total**
Number of study programmes	2	0	1	6	9
Number of active studies in the study programmes	1	0	20	89	110

Tab. 2.6: Lifelong learning courses (LLL) at the university (number of courses)

CTU in Prague		Courses for professional development			Free-time courses			U3V	TOTAL
		up to 15 hrs	from 16 to 100 hrs	over 100 hrs	up to 15 hrs	from 16 to 100 hrs	over 100 hrs		
Broad fields of education in ISCED-F	**code**								
Generic programmes and qualifications	00		5			18			**23**
Education	01		3	4		2			**9**
Arts and humanities	02		7	5	5	61	28	14	**120**
Social sciences, journalism and information	03	1	7			1		56	**65**
Business, administration and law	04			1					**1**
Natural sciences, mathematics and atatistics	05	2	23	1	10	2		8	**46**
Information and Communication Technologies	06		2			1			**3**
Engineering, manufacturing and statistics	07	2	84	1				12	**99**
Agriculture, forestry, fisheries and construction	08								**0**
Health and welfare	09							4	**4**
Services	10								**0**
TOTAL	**X**	**5**	**131**	**12**	**15**	**85**	**28**	**94**	**370**

Tab. 3.1: Students in accredited study programmes (number of studies)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Faculty of Civil Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	1,999				908		218	180	3,305
Faculty total	**X**	**1,999**				**908**		**218**	**180**	**3,305**
Of which women	X	793				368		79	68	1,308
Of which foreigners	X	299				102		22	11	434
Faculty of Mechanical Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	1,322	83			749	44	160	116	2,474
Faculty total	**X**	**1,322**	**83**			**749**	**44**	**160**	**116**	**2,474**
Of which women	X	114	9			79	2	24	20	248
Of which foreigners	X	157	5			149	2	23	16	352
Faculty of Electrical Engineering*										
Broad fields of education in ISCED-F	code									
Business, administration and law	04							2	1	3
Natural sciences, mathematics and atatistics	05							6		6
Information and Communication Technologies	06	722	8			298		25		1,053
Engineering, manufacturing and statistics	07	966	33			472	18	144	123	1,756
Faculty total	**X**	**1,688**	**41**			**770**	**18**	**177**	**124**	**2,818**
Of which women	X	248	6			127	1	14	23	419
Of which foreigners	X	366	4			195	0	48	27	640
Faculty of Nuclear Sciences and Physical Engineering*										
Broad fields of education in ISCED-F	code									
Natural sciences, mathematics and atatistics	05	612				5		6	2	625
Information and Communication Technologies	06					190				190
Engineering, manufacturing and statistics	07							162	103	265
Health and welfare	09	16								16
Faculty total	**X**	**628**				**195**		**168**	**105**	**1,096**
Of which women	X	227				74		39	23	363
Of which foreigners	X	141				33		26	18	218
Faculty of Architecture*										
Broad fields of education in ISCED-F	code									
Arts and humanities	02	99				47		8		154
Engineering, manufacturing and statistics	07	836				460		69	51	1,416
Faculty total	**X**	**935**				**507**		**77**	**51**	**1,570**
Of which women	X	592				300		42	24	958
Of which foreigners	X	223				128		11	6	368

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Tab. 3.1: Students in accredited study programmes (number of studies)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Faculty of Transportation Sciences*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07							9	21	30
Services	10	787	52			206	77	48	42	1,212
Faculty total	**X**	**787**	**52**			**206**	**77**	**57**	**63**	**1,242**
Of which women	X	159	16			78	24	21	15	313
Of which foreigners	X	226	7			38	9	7	8	295
Faculty of Biomedical Engineering*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06					6		6	2	14
Engineering, manufacturing and statistics	07	268	8			101	19	26	36	458
Health and welfare	09	562				29	33	12	7	643
Services	10	66	68			70	125	6	35	370
Faculty total	**X**	**896**	**76**			**206**	**177**	**50**	**80**	**1,485**
Of which women	X	633	17			135	76	21	29	911
Of which foreigners	X	90	1			19	12	2	6	130
Faculty of Information Technology*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06	1,553	130			412		28	24	2,147
Faculty total	**X**	**1,553**	**130**			**412**		**28**	**24**	**2,147**
Of which women	X	208	18			42		2	3	273
Of which foreigners	X	456	21			92		1	5	575
University institutes (studies outside faculties)*										
Broad fields of education in ISCED-F	code									
Education	01	1	223							224
Arts and humanities	02							2	9	11
Business, administration and law	04	492				246	91	1	2	832
Engineering, manufacturing and statistics	07							6	19	25
Faculty total	**X**	**493**	**223**			**246**	**91**	**9**	**30**	**1,092**
Of which women	X	284	94			158	56	2	7	601
Of which foreigners	X	57	3			24	8	2		94
CTU in Prague										
Broad fields of education in ISCED-F	code									
Education	01	1	223							224
Arts and humanities	02	99				47		10	9	165
Business, administration and law	04	492				246	91	3	3	835
Natural sciences, mathematics and atatistics	05	612				5		12	2	631

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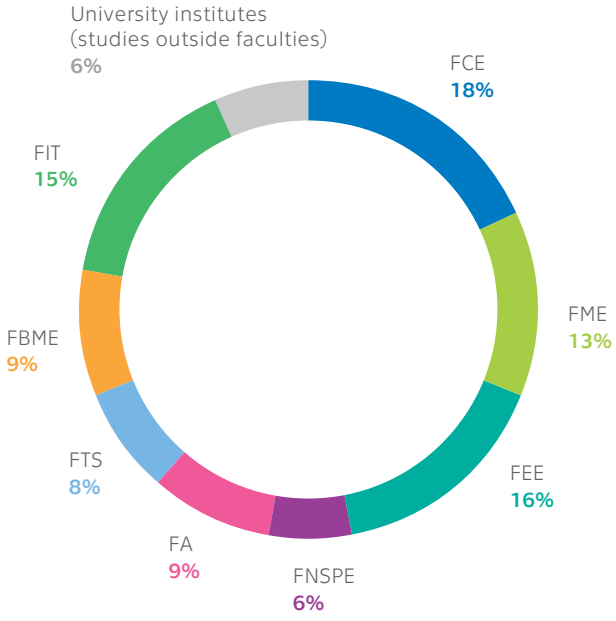
Tab. 3.1: Students in accredited study programmes (number of studies)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Information and Communication Technologies	06	2,275	138			906		59	26	3,404
Engineering, manufacturing and statistics	07	5,391	124			2,690	81	794	649	9,729
Health and welfare	09	578				29	33	12	7	659
Services	10	853	120			276	202	54	77	1,582
CTU TOTAL	**X**	**10,301**	**605**			**4,199**	**407**	**944**	**773**	**17,229**
Of which women	X	3,258	160			1,361	159	244	212	5,394
Of which foreigners	X	2,015	41			780	31	142	97	3,106

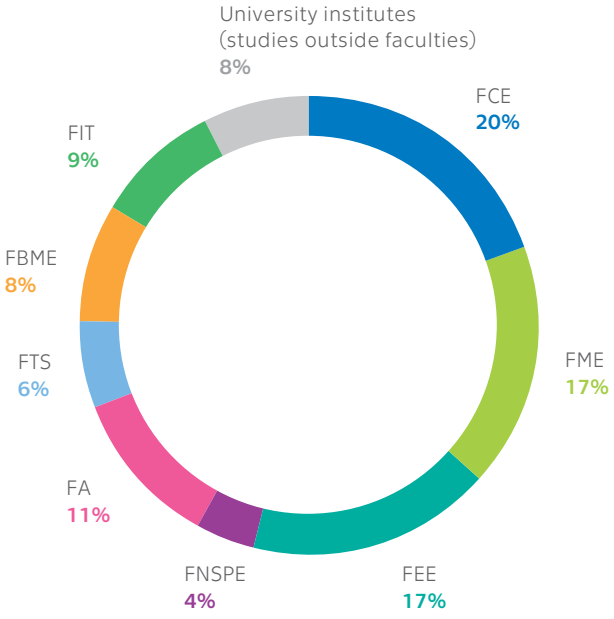
Note: * The faculty or the constituent part of the university implement an accredited study programme

P = full-time study
K/D = part-time/distance study

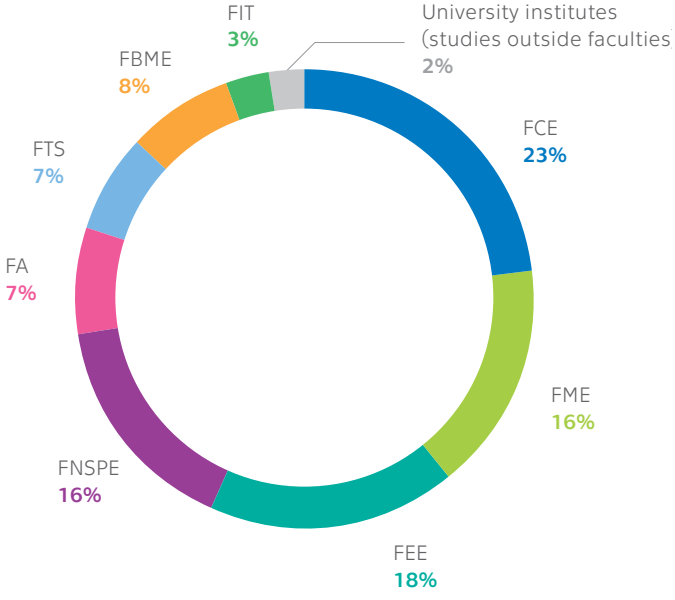
STUDENTS IN BACHELOR STUDY PROGRAMMES IN 2019



STUDENTS IN FOLLOW-UP MASTER STUDY PROGRAMMES IN 2019



STUDENTS IN DOCTORAL STUDY PROGRAMMES IN 2019



Tab. 3.3: Unsuccessful studies* in the first year** of studies (in %)

CTU in Prague	Bachelor study programmes			Master study programmes		
	P	K/D	TOTAL	P	K/D	TOTAL
Faculty of Civil Engineering***	36.5	0.0	36.5			
Faculty of Mechanical Engineering***	32.0	64.1	34.5			
Faculty of Electrical Engineering***	34.6	75.0	36.0			
Faculty of Nuclear Sciences and Physical Engineering***	51.3	0.0	51.3			
Faculty of Architecture***	17.7	0.0	17.7			
Faculty of Transportation Sciences***	41.6	68.4	44.2			
Faculty of Biomedical Engineering***	35.9	18.2	35.0			
Faculty of Information Technology***	46.7	64.0	48.7			
University institutes (studies outside faculties)	23.7	18.3	22.3			
CTU TOTAL	**36.7**	**52.7**	**37.7**			

Note: * The number of unsuccessful studies refers to the number of studies started in the given year n and the sum total of unsuccessful studies of this cohort in the years n and n+1. See Methodology.

Note: ** This refers to all students enrolled in the given university in the year n, whether they enrolled for the first time or not.

Note: *** The faculty or the constituent part of the university implement an accredited study programme

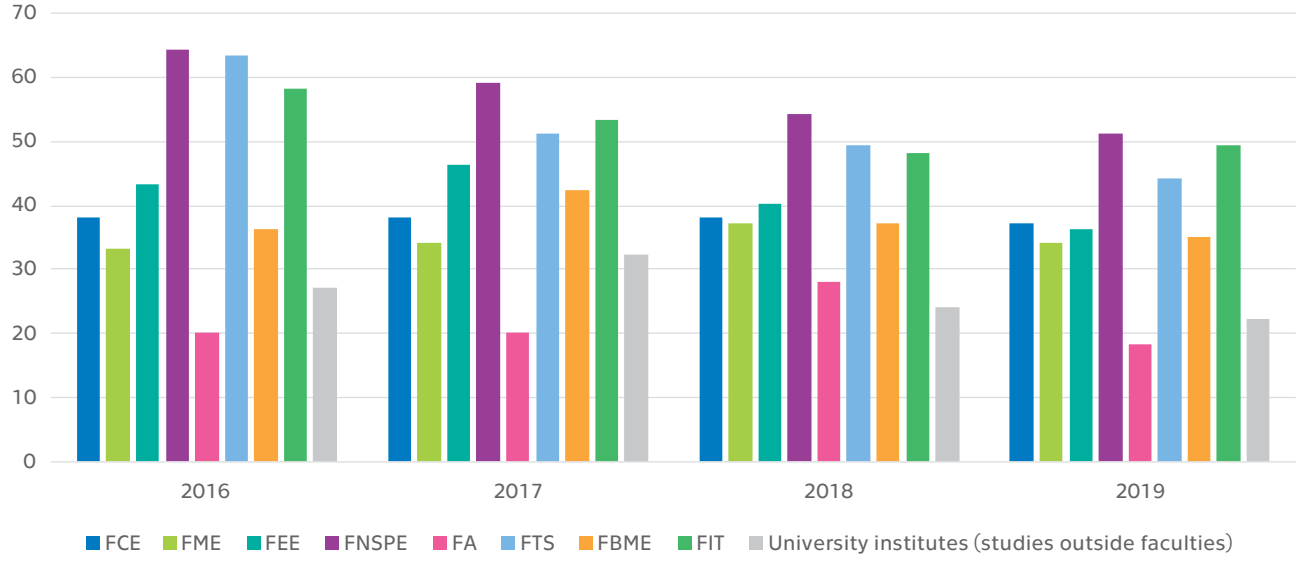
P = full-time study
K/D = part-time/distance study

The TOTAL value is not a sum of the previous values (e.g., for P and K/D in the given type of study). For each field in the table, a separate calculation must be made.

Example:
In 2018 (from 1 January till 31 December) a total of 500 students enrolled in bachelor study programmes. In 2018 and 2019, 180 out of this cohort did not succesfully complete their studies. The number of unsuccessful studies in this cohort in the 1st year of studies is 180/500 = 0.36, i.e. 36%.

Follow-up master study programmes			Doctoral study programmes			TOTAL
P	K/D	TOTAL	P	K/D	TOTAL	
4.5	0.0	4.5	5.2	7.7	5.6	22.5
6.1	36.0	7.9	17.9	21.1	19.0	25.3
17.7	22.2	17.8	22.2	38.5	25.0	29.4
16.5	0.0	16.5	9.7	42.9	13.0	40.0
7.5	0.0	7.5	4.0	0.0	3.1	13.4
18.5	44.7	26.2	10.5	14.3	11.5	38.5
32.8	32.7	32.8	33.3	38.9	36.4	34.3
28.5	0.0	28.5	0.0	0.0	0.0	44.5
26.8	57.8	34.9	0.0	0.0	0.0	27.2
14.2	**39.6**	**16.6**	**12.7**	**24.7**	**15.3**	**30.2**

UNSUCCESSFUL STUDIES IN THE FIRST YEAR OF BACHELOR'S STUDY (IN %)



Tab. 3.4: Student scholarships* by purpose (number of natural persons)

CTU in Prague		
Purpose of scholarship	**Number of students**	**Average scholarship****
For outstanding study results, pursuant to Section 91 Para 2 Letter a)	2,333	10,435
For outstanding scholarly, scientific, research, development, artistic or other creative results, pursuant to Section 91 Para 2 Letter b)	1,037	12,156
For research, development and innovation activities, pursuant to a special regulation, pursuant to Section 91 Para 2 Letter c)	934	30,832
For a student with difficult social conditions, pursuant to Section 91 Para 2 Letter d)	561	31,082
For a student with difficult social conditions, pursuant to Section 91 Para 3	28	28,321
For other cases worthy of special consideration, pursuant to Section 91 Para 2 Letter e)	15,106	6,053
Of which housing scholarships	**13,393**	**3,890**
In support of studies abroad, pursuant to Section 91 Para 4 Letter a)	850	31,718
In support of studies in the Czech Republic, pursuant to Section 91 Para 4 Letter b)	184	58,639
For students in doctoral degree programmes, pursuant to Section 91 Para 4 Letter c)	1,062	81,541
Other scholarships	316	11,366
TOTAL***	**22,411**	**13,536**

Note: * Regardless of the source of funding, it does not concern funds of the Ministry of Education, Youth and Sport.

Note: ** The share of the total sum paid out for the given type of scholarship in a year and the total amount of natural persons who received the given scholarship at least once in the given year. In case one person received the scholarship more than once, that person is included only once, but the calculation reflects the sum total of the amounts paid out to that person.

Note: *** Since the table gives the number of physical persons that can be recipients of multiple scholarships, the "total" number is not a sum of the previous lines, but it gives the real total number of students.

Example:
In the given year, the university paid out a total of CZK 15,000 to students for outstanding study results, pursuant to Section 91 Para 2 Letter a). Three students were recipients of this scholarship; two of them received it once and one of them three times. The average scholarship was CZK 5,000 (=15,000/3).

Tab. 4.1: Graduates from accredited study programmes (number of completed studies)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Faculty of Civil Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	411				570		2	41	1,024
Faculty total	**X**	**411**				**570**		**2**	**41**	**1,024**
Of which women	X	176				255		1	13	445
Of which foreigners	X	58				35		1	2	96
Faculty of Mechanical Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	313	16			310	10	18	9	676
Faculty total	**X**	**313**	**16**			**310**	**10**	**18**	**9**	**676**
Of which women	X	33	2			36		4		75
Of which foreigners	X	32				59		2	1	94
Faculty of Electrical Engineering*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06	101	4			79				184
Engineering, manufacturing and statistics	07	145	4			216	8	4	48	425
Health and welfare	09					12				12
Faculty total	**X**	**246**	**8**			**307**	**8**	**4**	**48**	**621**
Of which women	X	39				37	3	1	8	88
Of which foreigners	X	53	1			66		3	12	135
Faculty of Nuclear Sciences and Physical Engineering*										
Broad fields of education in ISCED-F	code									
Natural sciences, mathematics and statistics	05	84								84
Information and Communication Technologies	06					76				76
Engineering, manufacturing and statistics	07								30	30
Faculty total	**X**	**84**				**76**			**30**	**190**
Of which women	X	30				26			10	66
Of which foreigners	X	11				12			4	27
Faculty of Architecture*										
Broad fields of education in ISCED-F	code									
Arts and humanities	02	22				20				42
Engineering, manufacturing and statistics	07	148				174		6	6	334
Faculty total	**X**	**170**				**194**		**6**	**6**	**376**
Of which women	X	108				120		2	3	233
Of which foreigners	X	43				38			1	82

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Tab. 4.1: Graduates from accredited study programmes (number of completed studies)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
Faculty of Transportation Sciences*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07							1	5	6
Services	10	110	5			110	34	2	9	270
Faculty total	**X**	**110**	**5**			**110**	**34**	**3**	**14**	**276**
Of which women	X	33	1			40	9		3	86
Of which foreigners	X	18	1			16	4	1	2	42
Faculty of Biomedical Engineering*										
Broad fields of education in ISCED-F	code									
Engineering, manufacturing and statistics	07	59				63	16		5	143
Health and welfare	09	115								115
Services	10	23	14			29	48			114
Faculty total	**X**	**197**	**14**			**92**	**64**		**5**	**372**
Of which women	X	125	4			56	29		4	218
Of which foreigners	X	19				6	3		3	31
Faculty of Information Technology*										
Broad fields of education in ISCED-F	code									
Information and Communication Technologies	06	198	6			156			8	368
Faculty total	**X**	**198**	**6**			**156**			**8**	**368**
Of which women	X	25				16			1	42
Of which foreigners	X	45	1			29			1	76
University institutes (studies outside faculties)*										
Broad fields of education in ISCED-F	code									
Education	01		48							48
Arts and humanities	02								1	1
Business, administration and law	04	101				91				192
Engineering, manufacturing and statistics	07								3	3
Faculty total	**X**	**101**	**48**			**91**			**4**	**244**
Of which women	X	73	15			57			1	146
Of which foreigners	X	6				4				10

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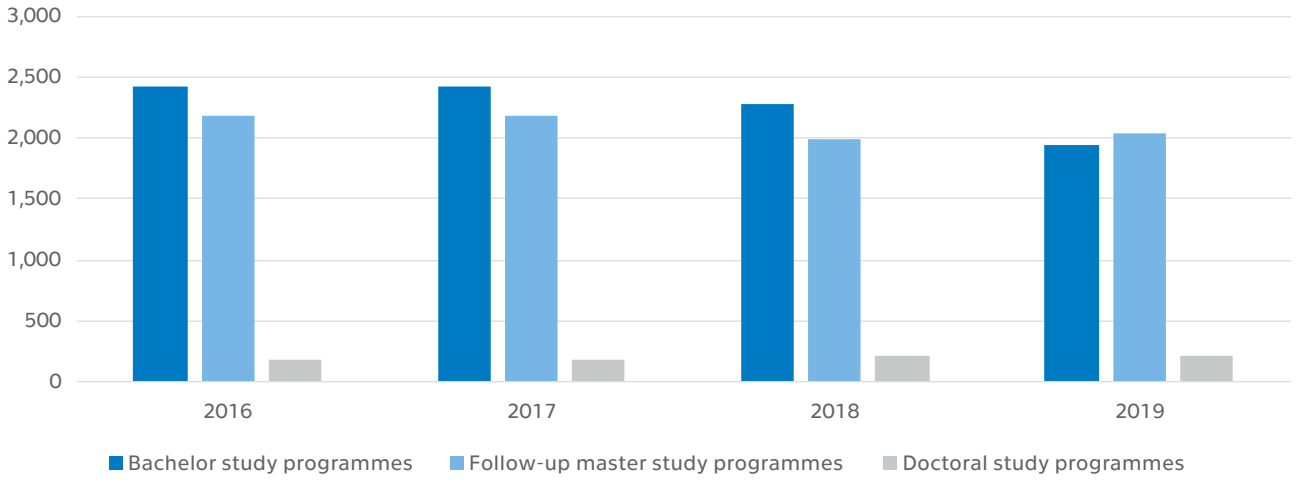
Tab. 4.1: Graduates from accredited study programmes (number of completed studies)

CTU in Prague		Bachelor study programmes		Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL
		P	K/D	P	K/D	P	K/D	P	K/D	
CTU in Prague										
Broad fields of education in ISCED-F	code									
Education	01		48							48
Arts and humanities	02	22				20			1	43
Business, administration and law	04	101				91				192
Natural sciences, mathematics and atatistics	05	84								84
Information and Communication Technologies	06	299	10			311			8	628
Engineering, manufacturing and statistics	07	1,076	20			1,333	34	31	147	2,641
Health and welfare	09	115				12				127
Services	10	133	19			139	82	2	9	384
CTU TOTAL	**X**	**1,830**	**97**			**1,906**	**116**	**33**	**165**	**4,147**
Of which women	X	642	22			643	41	8	43	1,399
Of which foreigners	X	285	3			265	7	7	26	593

Note: * The faculty or the constituent part of the university implement an accredited study programme

P = full-time study
K/D = part-time/distance study; the table shows the number of successfully completed studies (not natural persons) in the period 1 January – 31 December.

GRADUATES FROM ACCREDITED STUDY PROGRAMMES (NUMBER OF COMPLETED STUDIES)



Tab. 5.1: Interest in studying at the university

CTU in Prague		Bachelor study programmes				
		Number of applicants (natural persons)	Number of applications	Number of admitted students	Number of enrolled students	Number of applicants (natural persons)
Faculty of Civil Engineering*						
Broad fields of education in ISCED-F	code					
Engineering, manufacturing and statistics	07	1,326	1,580	947	701	
Faculty total	**X**	**1,326**	**1,580**	**947**	**701**	
Faculty of Mechanical Engineering*						
Broad fields of education in ISCED-F	code					
Engineering, manufacturing and statistics	07	1,022	1,048	582	573	
Faculty total	**X**	**1,022**	**1,048**	**582**	**573**	
Faculty of Electrical Engineering*						
Broad fields of education in ISCED-F	code					
Business, administration and law	04					
Natural sciences, mathematics and atatistics	05					
Information and Communication Technologies	06	866	1,036	375	307	
Engineering, manufacturing and statistics	07	955	1,165	638	488	
Faculty total	**X**	**1,821**	**2,201**	**1,013**	**795**	
Faculty of Nuclear Sciences and natural Engineering*						
Broad fields of education in ISCED-F	code					
Natural sciences, mathematics and atatistics	05	479	487	364	311	
Information and Communication Technologies	06					
Engineering, manufacturing and statistics	07					
Faculty total	**X**	**479**	**487**	**364**	**311**	
Faculty of Architecture*						
Broad fields of education in ISCED-F	code					
Arts and humanities	02	153	153	45	38	
Engineering, manufacturing and statistics	07	573	626	455	358	
Faculty total	**X**	**726**	**779**	**500**	**396**	
Faculty of Transportation Sciences*						
Broad fields of education in ISCED-F	code					
Engineering, manufacturing and statistics	07					
Services	10	750	847	563	395	
Faculty total	**X**	**750**	**847**	**563**	**395**	
Faculty of Biochemical Engineering*						
Broad fields of education in ISCED-F	code					
Information and Communication Technologies	06					
Engineering, manufacturing and statistics	07	315	347	188	150	
Health and welfare	09	666	751	353	282	
Services	10	121	130	65	57	
Faculty total	**X**	**1,102**	**1,228**	**606**	**489**	

Master study programmes			Follow-up master study programmes				Doctoral study programmes			
Number of applications	Number of admitted students	Number of enrolled students	Number of applicants (natural persons)	Number of applications	Number of admitted students	Number of enrolled students	Number of applicants (natural persons)	Number of applications	Number of admitted students	Number of enrolled students
			489	627	556	419	83	84	84	84
			489	**627**	**556**	**419**	**83**	**84**	**84**	**84**
			496	527	364	358	76	76	72	68
			496	**527**	**364**	**358**	**76**	**76**	**72**	**68**
							4	4	4	4
							6	6	6	6
			255	263	175	147	32	32	30	30
			303	332	233	196	60	60	57	56
			558	**595**	**408**	**343**	**102**	**102**	**97**	**96**
							9	9	9	9
			112	112	85	79				
							36	36	36	35
			112	**112**	**85**	**79**	**45**	**45**	**45**	**44**
			28	28	16	16	3	3	3	3
			205	211	162	151	37	37	28	25
			233	**239**	**178**	**167**	**40**	**40**	**31**	**28**
							9	9	6	6
			236	256	163	143	35	35	31	31
			236	**256**	**163**	**143**	**44**	**44**	**37**	**37**
			19	21	9	7	8	8	8	8
			59	70	47	31				
			106	116	76	67	26	28	26	22
			226	226	101	100	13	13	12	12
			410	**433**	**233**	**205**	**47**	**49**	**46**	**42**

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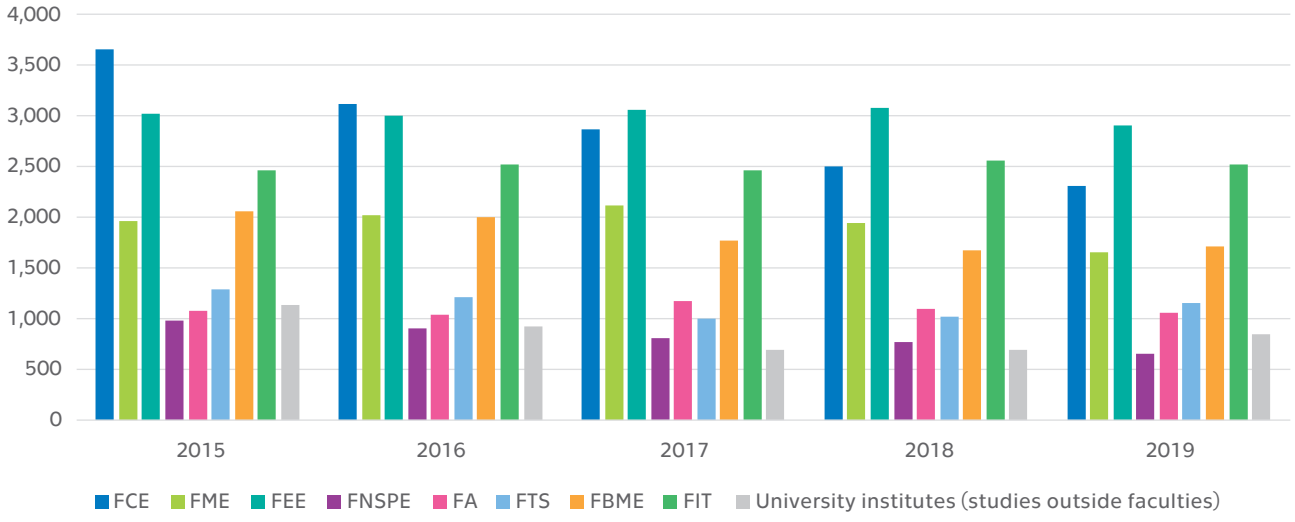
Tab. 5.1: Interest in studying at the university

CTU in Prague		Bachelor study programmes				
		Number of applicants (natural persons)	Number of applications	Number of admitted students	Number of enrolled students	Number of applicants (natural persons)
Faculty of Information Technology*						
Broad fields of education in ISCED-F	code					
Information and Communication Technologies	06	2,042	2,133	1,057	904	
Faculty total	**X**	**2,042**	**2,133**	**1,057**	**904**	
Masaryk Institute of Advanced Studies*						
Broad fields of education in ISCED-F	code					
Education	01	100	100	95	92	
Business, administration and law	04	466	467	408	261	
Total	**X**	**566**	**567**	**503**	**353**	
CTU in Prague						
Broad fields of education in ISCED-F	code					
Education	01	100	100	95	92	
Arts and humanities	02	153	153	45	38	
Business, administration and law	04	466	467	408	261	
Natural sciences, mathematics and atatistics	05	479	487	364	311	
Information and Communication Technologies	06	2,908	3,169	1,432	1,211	
Engineering, manufacturing and statistics	07	4,191	4,766	2,810	2,270	
Health and welfare	09	666	751	353	282	
Services	10	871	977	628	452	
CTU TOTAL	**X**	**9,834**	**10,870**	**6,135**	**4,917**	

Note: * The faculty or the constituent part of the university implement an accredited study programme

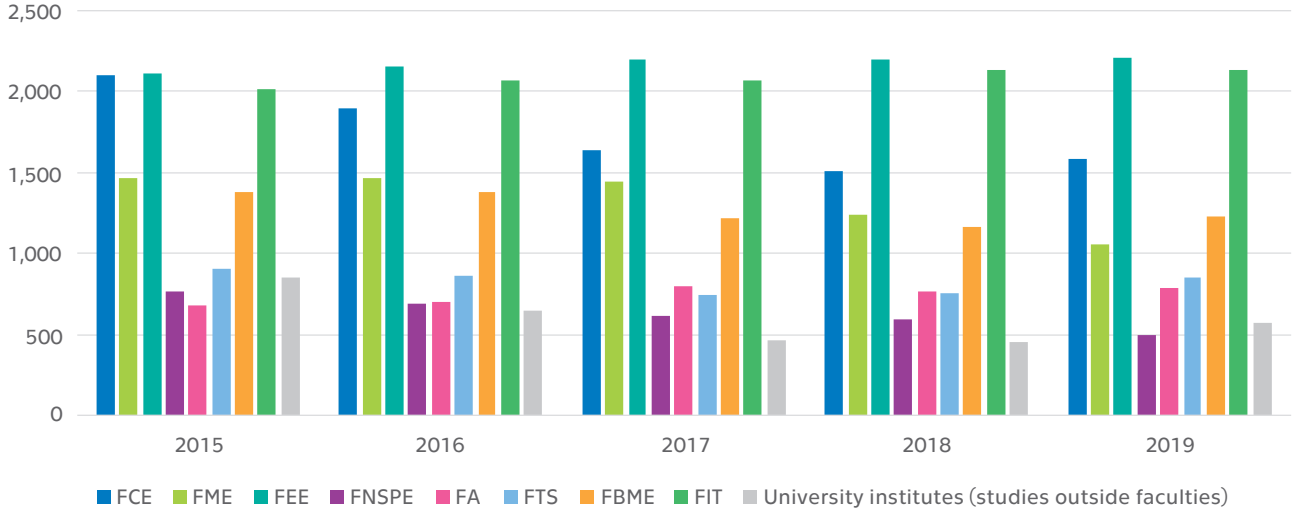
P = full-time study
K/D = part-time/distance study

NUMBER OF APPLICATIONS (BC., NMGR., PH.D. STUDY TOTAL)

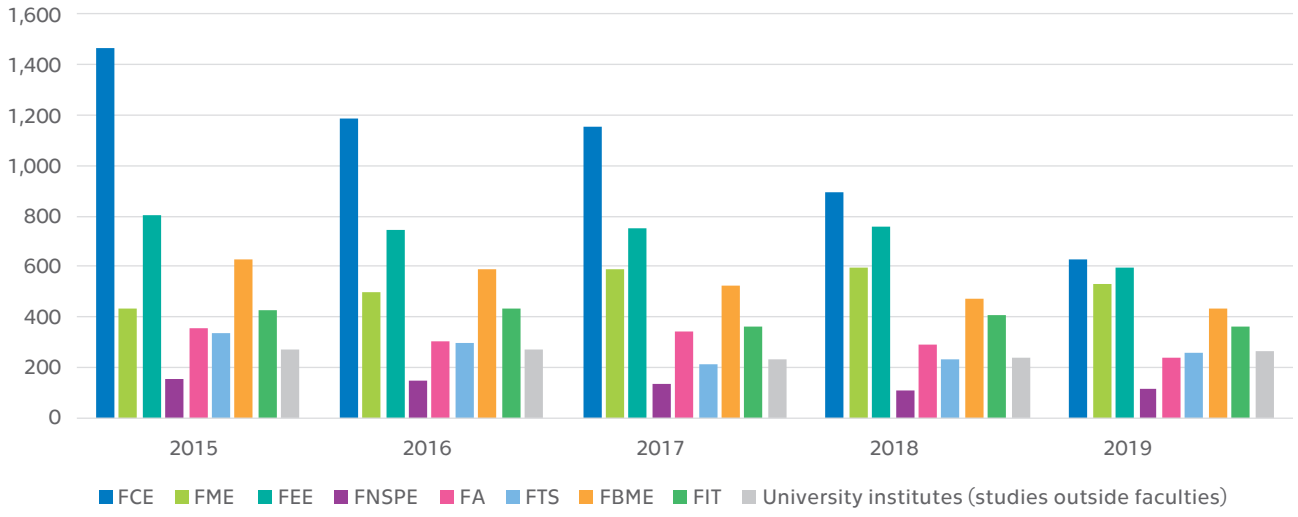


Master study programmes			Follow-up master study programmes				Doctoral study programmes			
Number of applications	Number of admitted students	Number of enrolled students	Number of applicants (natural persons)	Number of applications	Number of admitted students	Number of enrolled students	Number of applicants (natural persons)	Number of applications	Number of admitted students	Number of enrolled students
			354	358	223	202	13	14	11	10
			354	**358**	**223**	**202**	**13**	**14**	**11**	**10**
			258	264	225	197				
			258	**264**	**225**	**197**	**0**	**0**	**0**	**0**
			28	28	16	16	3	3	3	3
			258	264	225	197	4	4	4	4
							15	15	15	15
			740	754	492	435	53	54	49	48
			1,552	1,767	1,362	1,155	301	302	283	274
			106	116	76	67	26	28	26	22
			462	482	264	243	48	48	43	43
			3,146	**3,411**	**2,435**	**2,113**	**450**	**454**	**423**	**409**

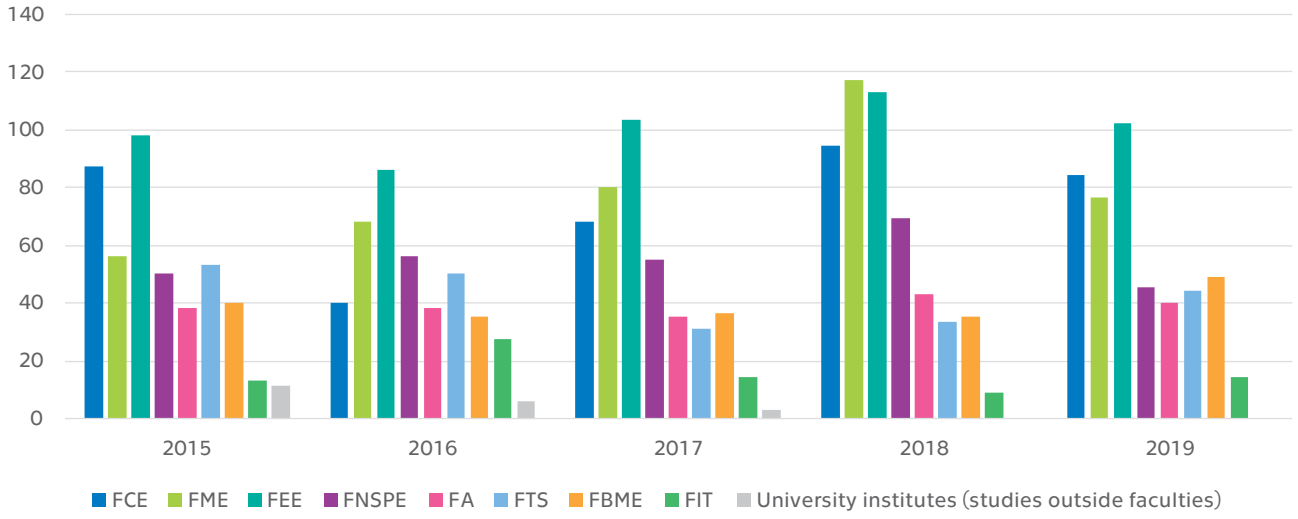
NUMBER OF APPLICATIONS (Bc. STUDY)



NUMBER OF APPLICATIONS (NMgr. STUDY)



NUMBER OF APPLICATIONS (Ph.D. STUDY)



Tab. 6.1: Total academic and scientific staff and other employees (average converted numbers*)

CTU in Prague		Academic staff				
	Academic staff TOTAL	Professors	Docents	Fellows	Assistants	Lecturers
Faculty of Civil Engineering******	**367.0**	**52.7**	**105.3**	**208.9**	**0.0**	**0.0**
Number of women	92.8	5.7	19.5	67.6	0.0	0.0
Faculty of Mechanical Engineering	**277.1**	**30.3**	**42.4**	**172.1**	**25.7**	**2.7**
Number of women	26.9	0.4	3.4	19.2	0.6	2.3
Faculty of Electrical Engineering******	**256.7**	**49.0**	**67.8**	**118.2**	**0.4**	**21.3**
Number of women	21.1	2.0	3.0	15.4	0.0	0.7
Faculty of Nuclear Sciences and Physical Engineering******	**142.7**	**27.0**	**31.4**	**82.0**	**1.0**	**1.2**
Number of women	22.8	3.0	0.7	17.8	1.0	0.2
Faculty of Architecture******	**114.8**	**13.3**	**23.9**	**77.2**	**0.2**	**0.0**
Number of women	35.4	1.0	5.1	29.3	0.0	0.0
Faculty of Transportation Sciences******	**129.9**	**9.8**	**30.1**	**86.9**	**3.1**	**0.0**
Number of women	38.4	1.5	5.4	30.7	0.8	0.0
Faculty of Biomedical Engineering******	**97.0**	**9.5**	**14.6**	**23.5**	**48.5**	**1.0**
Number of women	37.6	1.3	2.5	12.0	21.8	0.0
Faculty of Information Technology******	**96.1**	**4.3**	**16.3**	**75.4**	**0.0**	**0.0**
Number of women	14.1	0.0	3.0	11.1	0.0	0.0
Masaryk Institute of Advanced Studies******	**47.6**	**3.0**	**10.8**	**33.0**	**0.0**	**0.1**
Number of women	26.0	2.0	4.9	19.0	0.0	0.1
Other institutes at CTU total	**62.5**	**6.4**	**5.4**	**40.7**	**1.0**	**0.0**
Number of women	12.5	1.0	1.0	9.2	1.1	0.0
TOTAL	**1,591.3**	**205.3**	**348.0**	**917.9**	**79.9**	**26.3**
Women total	**327.5**	**17.9**	**48.4**	**231.1**	**25.2**	**3.3**

Note: * Average converted number is the number of all hours worked in the monitored period from 1 January to 31 December (by all employees in monitored categories, including agreements to perform work, not including contracts for work) converted to the total annual working hours of one full-time employee.

Note: ** In this case, scientific staff are employees who are not academic staff under Section 70, Act No. 111/1998 Coll., on Higher Education Institutions.

Note: *** An employee of the given research institution or university up to 5 years after the award of the Ph.D. degree or its equivalent. They work as part of a scientific team of the given institution under supervision of experienced scientific workers on a specific task and publish their results independently and as part of the team. They have concluded an employment contract with the research institution for a definite period of time (lasting 1–3 years) for one, maximum three subsequent periods. Their salary is regulated by the rules of the wage system of the given institution, while at the same time they can receive remuneration under research grant projects.

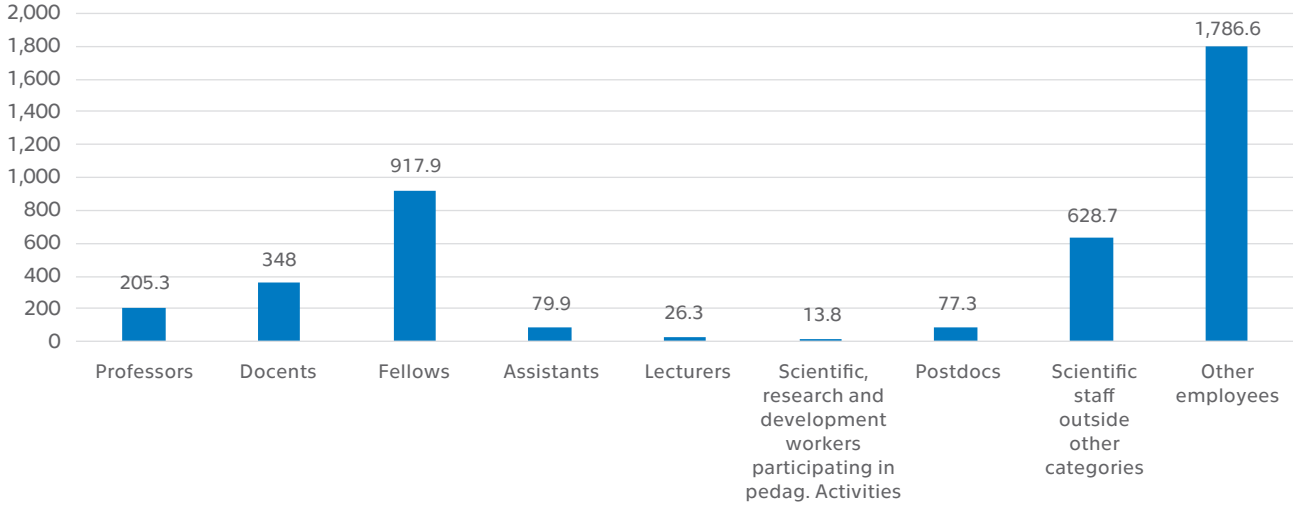
Note: **** The category "other scientific, research and development employees" includes technical and specialized staff that do not directly participate in research, but are indispensable for the research activity (for instance, operators of research facilities).

Note: ***** Other employees refer to all other workers that do not directly participate in education and research. They include, in particular, administrative, technical and other employees.

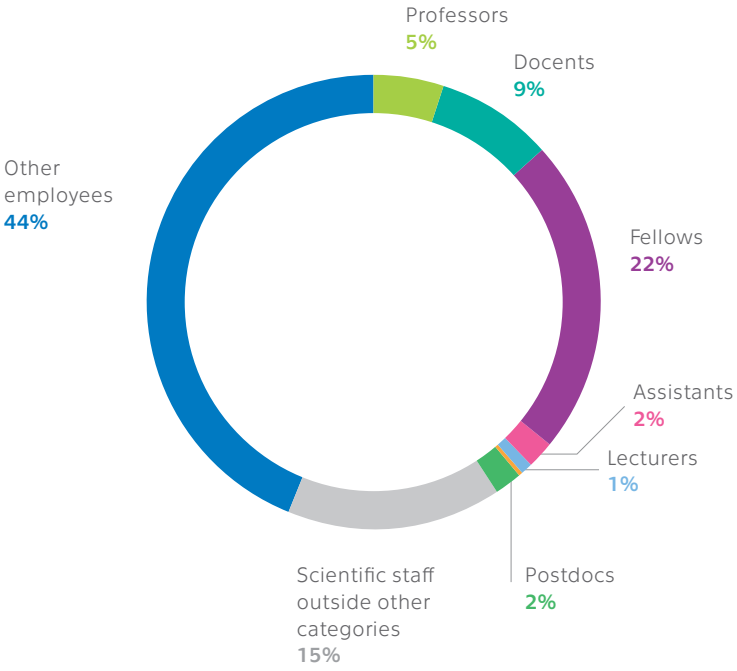
Note: ****** The faculty or the constituent part of the university implement an accredited study programme

		Scientific and expert staff**				
Scientific, research and development workers participating in pedag. activities	Extraordinary professors	Postdocs***	Scientific staff outside other categories	Other scientific, research and development workers****	Other employees*****	Emloyees TOTAL
0.1		**16.5**	**62.2**	**0.0**	**222.7**	**668.4**
0.1		3.8	22.2		131.6	250.4
3.8		**3.6**	**23.7**	**0.0**	**256.0**	**560.4**
1.0		0.0	4.2	0.0	95.3	126.4
0.0		**27.2**	**160.4**	**0.0**	**202.7**	**647.0**
0.0		1.2	13.3		108.3	143.9
0.1		**6.7**	**116.2**	**0.0**	**113.1**	**378.7**
0.1		3.7	27.3	0.0	73.2	127.0
0.1		**1.6**	**5.8**	**0.0**	**58.8**	**181.0**
0.0		0.3	3.3	0.0	42.7	81.5
0.0		**4.5**	**5.9**	**0.0**	**98.8**	**239.0**
0.0		2.0	2.1	0.0	56.5	99.0
0.0		**0.7**	**15,2**	**0.0**	**38.9**	**151.9**
0.0		0.0	3.1	0.0	28.7	69.4
0.0		**6.1**	**11.1**	**0.0**	**52.9**	**166.2**
0.0		0.0	0.7	0.0	32.2	46.9
0.8		**0.0**	**1.9**	**0.0**	**30.0**	**79.5**
0.0		0.0	0.7	0.0	19.6	46.2
9.0		**10.4**	**226.3**	**0.0**	**712.8**	**1,012.0**
0.3		2.1	36.0	0.0	410.3	460.9
13.8	**0.0**	**77.3**	**628.7**	**0.0**	**1,786.6**	**4,084.0**
1.5	**0.0**	**13.0**	**112.9**	**0.0**	**998.2**	**1,451.7**

STAFF STRUCTURE AT CTU IN 2019 (AVERAGE CONVERTED NUMBERS)



STAFF STRUCTURE AT CTU IN 2019



STAFF STRUCTURE ACCORDING TO INDIVIDUAL FACULTIES IN 2019

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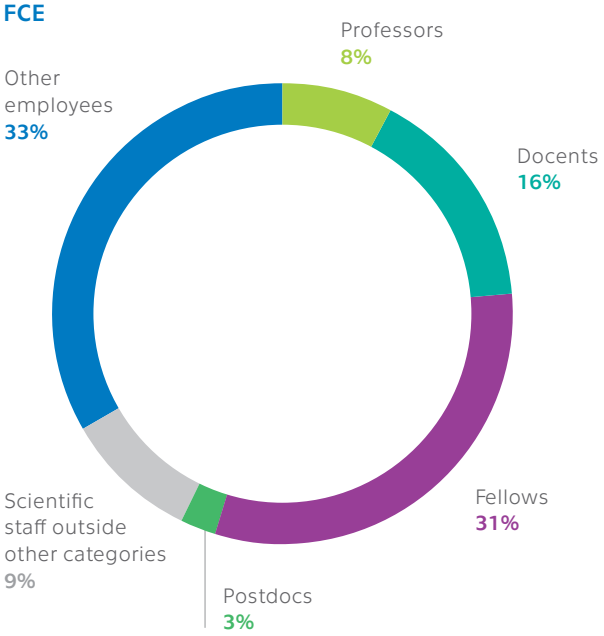

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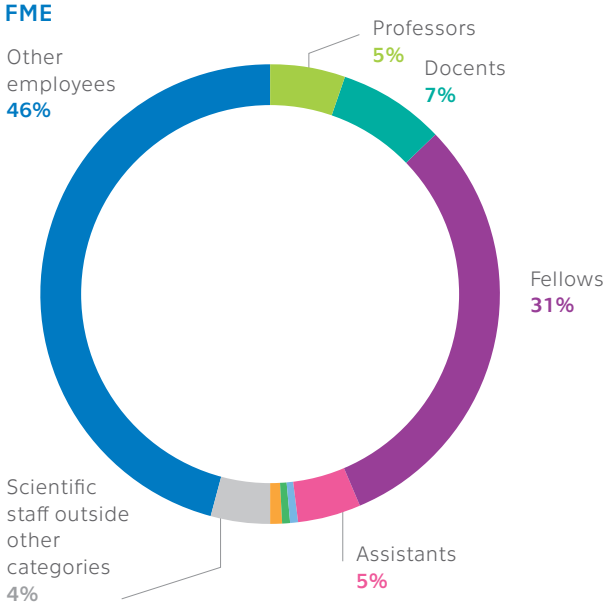

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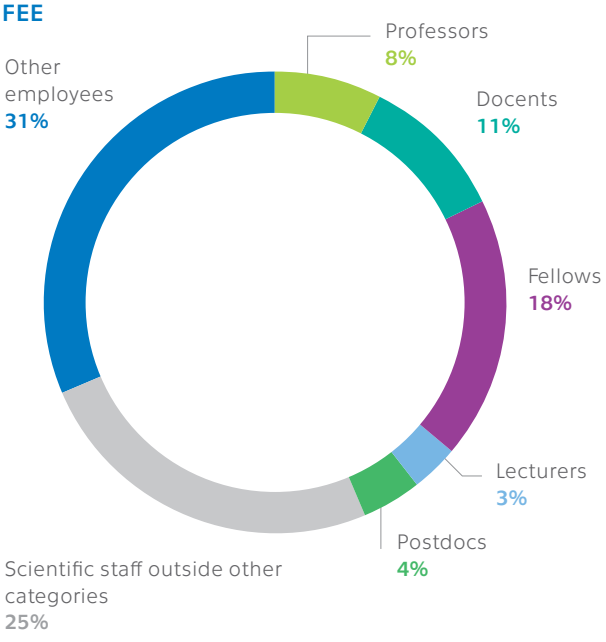

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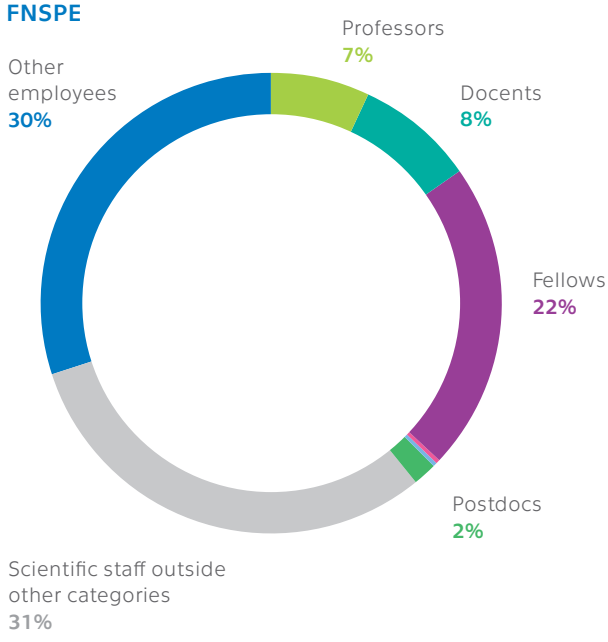
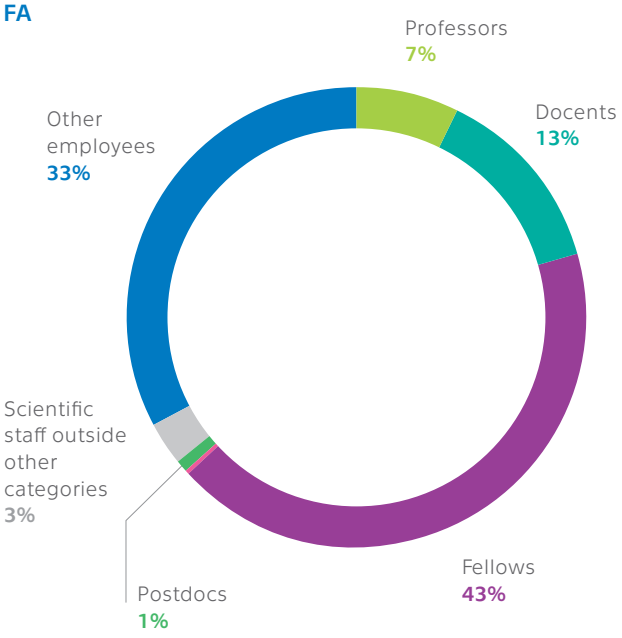


STAFF STRUCTURE ACCORDING TO INDIVIDUAL FACULTIES IN 2019

FA



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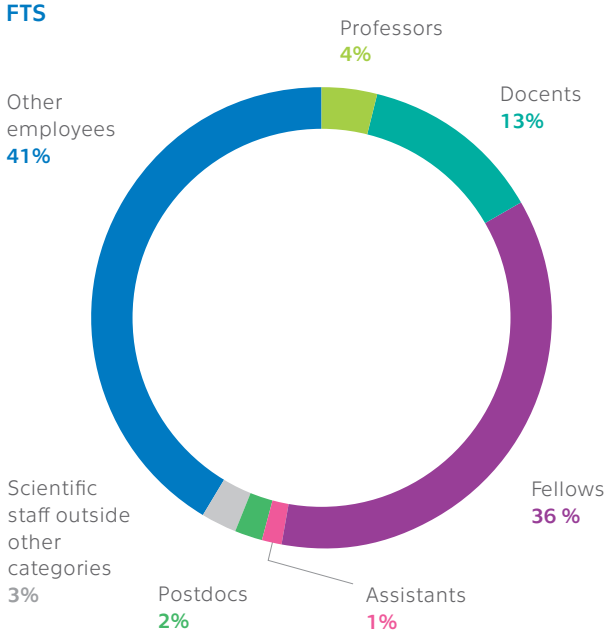

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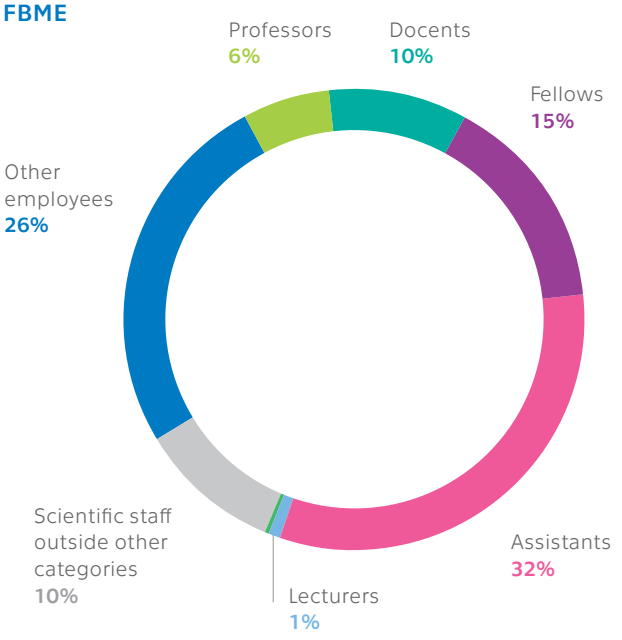

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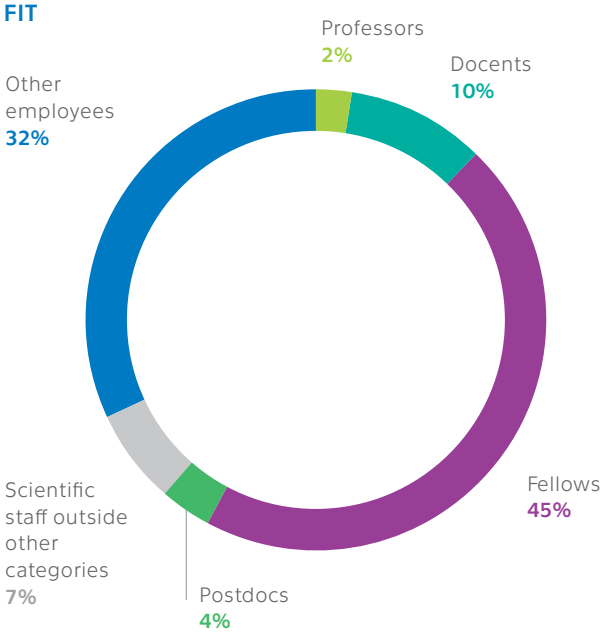
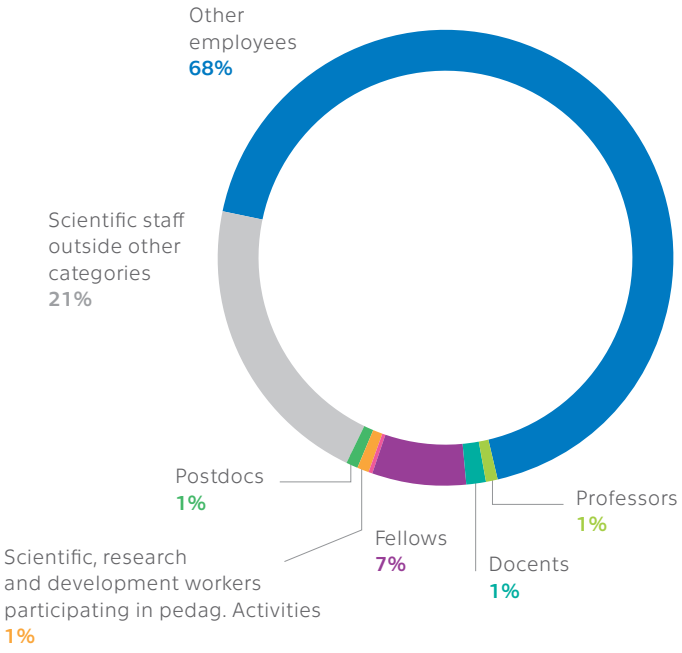


UNIVERSITY INSTITUTES
(STUDIES OUTSIDE FACULTIES)



Tab. 6.5: Academic and scientific staff with foreign citizenship (average converted numbers******)

CTU in Prague	Academic staff				
	Professors	Docents	Fellows	Assisstants	Lecturers
Faculty of Civil Engineering*	**0.5**	**0.52**	**2.75**	**0**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	0	0	0
Austria	0	0	0	0	0
Slovakia	0.5	0.52	1	0	0
Other EU memeber states	0	0	0.17	0	0
Other states outside the EU	0	0	1.58	0	0
Of which women total (regardless of citizenship)	0	0	1.92	0	0
Faculty of Mechanical Engineering*	**1.35**	**0**	**4.09**	**0**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	0	0	0
Austria	0	0	0	0	0
Slovakia	1	0	2.09	0	0
Other EU memeber states	0.25	0	0	0	0
Other states outside the EU	0,1	0	2	0	0
Of which women total (regardless of citizenship)	0	0	1	0	0
Faculty of Electrical Engineering*	**1**	**3.92**	**6.08**	**0.07**	**1.33**
Of which: Germany	0	1	0	0	0
Poland	0	0	1	0	0
Austria	0	0	0	0	0
Slovakia	1	1.92	1.68	0	0
Other EU memeber states	0	1	1.67	0.07	0.33
Other states outside the EU	0	0	1.73	0	1
Of which women total (regardless of citizenship)	0	0	0.67	0	0.33
Faculty of Nuclear Sciences and Physical Engineering*	**1.92**	**0**	**5.38**	**1**	**0.1**
Of which: Germany	0	0	0	0	0
Poland	0	0	0	0	0
Austria	0	0	0	0	0
Slovakia	0.92	0	3.05	1	0.1
Other EU memeber states	0	0	2	0	0
Other states outside the EU	1	0	0.33	0	0
Of which women total (regardless of citizenship)	0	0	1.33	1	0

	Scientific and expert staff**			
Scientific, research and development workers participating in pedag. Activities	Postdocs***	Scientific staff outside other categories	Other scientific, research and development workers****	Other employees*****
0	**0.25**	**3.25**	**0**	**2.03**
0	0	0.25	0	0
0	0	0.18	0	0
0	0	0	0	0
0	0.25	0.96	0	2
0	0	0.58	0	0
0	0	1.28	0	0.03
0	0.25	3.55	0	0.03
0	**0**	**5.44**	**0**	**6.82**
0	0	0.07	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0.82	0	3.82
0	0	2.52	0	1
0	0	2.03	0	2
0	0	2.13	0	2.42
0	**1.91**	**55.01**	**0**	**6.08**
0	0	2	0	0
0	0	0	0	0
0	0	0	0	0
0	1.33	9.23	0	4.88
0	0	13.45	0	1.2
0	0.58	30.33	0	0
0	0	8.62	0	3.47
0	**1.1**	**31.35**	**0**	**2.02**
0	0	1	0	0
0	0	1.85	0	1
0	0	0	0	0
0	1.1	13.69	0	0.67
0	0	3.74	0	0
0	0	11.07	0	0.35
0	1	7.21	0	0.67

>>>

Tab. 6.5: Academic and scientific staff with foreign citizenship (average converted numbers******)

CTU in Prague	Academic staff				
	Professors	Docents	Fellows	Assisstants	Lecturers
Faculty of Architecture*	**2**	**0.5**	**3.66**	**0**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	1	0	0
Austria	0	0	0	0	0
Slovakia	1	0	0.6	0	0
Other EU memeber states	1	0.5	0.5	0	0
Other states outside the EU	0	0	1.56	0	0
Of which women total (regardless of citizenship)	0	0	0.5	0	0
Faculty of Transportation Sciences*	**0**	**1.5**	**5.24**	**0**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	1,3	0	0
Austria	0	0	0	0	0
Slovakia	0	1.5	3.26	0	0
Other EU memeber states	0	0	0	0	0
Other states outside the EU	0	0	0.68	0	0
Of which women total (regardless of citizenship)	0	1	0.16	0	0
Faculty of Biomedical Engineering*	**1**	**1.19**	**2.13**	**2.37**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	0	0	0
Austria	0	0	0	0	0
Slovakia	1	1.19	0.43	0.77	0
Other EU memeber states	0	0	0	0	0
Other states outside the EU	0	0	1.7	1.6	0
Of which women total (regardless of citizenship)	0	0	2.43	1.87	0
Faculty of Information Technology*	**0**	**0.5**	**7.62**	**0**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	0	0	0
Austria	0	0.5	0	0	0
Slovakia	0	0	2.96	0	0
Other EU memeber states	0	0	2.6	0	0
Other states outside the EU	0	0	2.06	0	0
Of which women total (regardless of citizenship)	0	0	3.48	0	0

	Scientific and expert staff**			
Scientific, research and development workers participating in pedag. Activities	Postdocs***	Scientific staff outside other categories	Other scientific, research and development workers****	Other employees*****
0	**0.25**	**0,39**	**0**	**1.6**
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	1.6
0	0.25	0.1	0	0
0	0	0.29	0	0
0	0.25	0.1	0	1.6
0	**0**	**0.67**	**0**	**2.03**
0		0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0.44		1.03
0	0	0	0	0
0	0	0.23	0	1
0	0	0.54	0	0
0	**0.1**	**0.25**	**0**	**0.5**
0	0	0	0	0.4
0	0	0	0	0
0	0	0	0	0
0	0.1	0.1	0	0
0	0	0	0	0.1
0	0	0.15	0	0
0	0	0.2	0	0
0	**0**	**5.63**	**0**	**4.88**
0	0	0	0	0
0	0	2.2	0	0
0	0	0	0	0
0	0	0.2	0	2.37
0	0	1	0	0
0	0	2.23	0	2.51
0	0	0.52	0	2.02

>>>

Tab. 6.5: Academic and scientific staff with foreign citizenship (average converted numbers******)

CTU in Prague	Academic staff				
	Professors	Docents	Fellows	Assisstants	Lecturers
Masaryk Institute of Advanced Studies*	**0**	**0.5**	**3.08**	**0**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	0	0	0
Austria	0	0	0	0	0
Slovakia	0	0	1.5	0	0
Other EU memeber states	0	0	0	0	0
Other states outside the EU	0	0.5	1.58	0	0
Of which women total (regardless of citizenship)	0	0.5	1.67	0	0
Other workplcaes total	**0**	**0**	**0**	**0**	**0**
Of which: Germany	0	0	0	0	0
Poland	0	0	0	0	0
Austria	0	0	0	0	0
Slovakia	0	0	0	0	0
Other EU memeber states	0	0	0	0	0
Other states outside the EU	0	0	0	0	0
Of which women total (regardless of citizenship)	0	0	0	0	0
CTU TOTAL	**6.42**	**8.63**	**40.03**	**3.44**	**1.43**
Of which: Germany	0	1	0	0	0
Poland	0	0	2	0	0
Austria	0	0.5	0	0	0
Slovakia	4.42	3.63	11.22	1.77	0.1
Other EU memeber states	1	1.5	6.94	0.07	0.33
Other states outside the EU	1	0.5	13.72	1.6	1
Of which women total (regardless of citizenship)	0	0.5	12	2.87	0.33

Note: * The faculty or the constituent part of the university implement an accredited study programme.

Note: ** In this case, scientific staff are employees who are not academic staff under Section 70, Act No. 111/1998 Coll., on Higher Education Institutions.

Note: *** An employee of the given research institution or university up to 5 years after the award of the Ph.D. degree or its equivalent. They work as part of a scientific team of the given institution under supervision of experienced scientific workers on a specific task and publish their results independently and as part of the team. They have concluded an employment contract with the research institution for a definite period of time (lasting 1–3 years) for one, maximum three subsequent periods. Their salary is regulated by the rules of the wage system of the given institution, while at the same time they can receive remuneration under research grant projects.

Note: **** The category "other scientific, research and development employees" includes technical and specialized staff that do not directly participate in research, but are indispensable for the research activity (for instance, operators of research facilities).

Note: ***** Other employees refer to all other workers that do not directly participate in education and research. They include, in particular, administrative, technical and other employees.

Note: ****** Average converted number means the number of all hours worked in the monitored period from 1 January to 31 December by all employees (in monitored categories, including agreements to perform work, not including contracts for work) converted to the total annual working hours of one full-time employee.

	Scientific and expert staff**			
Scientific, research and development workers participating in pedag. Activities	Postdocs***	Scientific staff outside other categories	Other scientific, research and development workers****	Other employees*****
0	**0**	**0.67**	**0**	**3.88**
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	3.38
0	0	0	0	0
0	0	0.67	0	0.5
0	0	0.67	0	1.96
0	**5.67**	**40.75**	**0**	**22.78**
0	0	5.46	0	0
0	0	0.88	0	0.33
0	0	0.13	0	0
0	4.67	7.63	0	9.69
0	0	13.8	0	2.67
0	1	12.85	0	10.09
0	2.92	8,25	0	14.89
0	**9.28**	**143.41**	**0**	**52.62**
0	0	8.71	0	0.4
0	0	5.11	0	1.33
0	0	0.13	0	0
0	7.45	31.81	0	24.59
0	0.25	32.67	0	3.97
0	1.58	58.87	0	13.48
0	4.42	29.12	0	24.64

Tab. 6.6: Newly appointed docents and professors (number)

CTU in Prague	Number			Average age of newly appointed persons***
	At CTU*		Permanent employees appointed at another university**	
	Total	Of which permanent employees at CTU		
Faculty of Civil Engineering**				
Professors appointed in 2019	4	4		53
Of which women	2	2		55
Docents appointed in 2019	7	5		45
Of which women	3	2		49
Faculty of Mechanical Engineering**				
Professors appointed in 2019	1	1		80
Of which women	0	0		
Docents appointed in 2019	3	3		45
Of which women	0	0		
Faculty of Electrical Engineering**				
Professors appointed in 2019	4	4		44
Of which women	0	0		
Docents appointed in 2019	7	7		38
Of which women	0	0		
Faculty of Nuclear Sciences and Physical Engineering**				
Professors appointed in 2019	1	1		52
Of which women	0	0		
Docents appointed in 2019	6	5		49
Of which women	1	0		53
Faculty of Architecture**				
Professors appointed in 2019	2	1		48
Of which women	1	0		50
Docents appointed in 2019	2	2		46
Of which women	0	0		

>>>

Tab. 6.6: Newly appointed docents and professors (number)

CTU in Prague	Number			Average age of newly appointed persons***
	At CTU*		Permanent employees appointed at another university**	
	Total	Of which permanent employees at CTU		
Faculty of Transportation Sciences**				
Professors appointed in 2019	0			
Of which women	0			
Docents appointed in 2019	0			
Of which women	0			
Faculty of Biomedical Engineering**				
Professors appointed in 2019	0			
Of which women	0			
Docents appointed in 2019	0			
Of which women	0			
Faculty of Information Technology**				
Professors appointed in 2019	0			
Of which women	0			
Docents appointed in 2019	1	1		40
Of which women	0			
Professors TOTAL	12			
Of which women	3			
Docents TOTAL	**26**	**23**		**46**
Of which women	4	2		50

Note: * The table includes all habilitations and appointments that took place at the given university in the given year, regardless of whether the newly appointed docents and professors were permanent employees of the given university.

Note: ** Number of docents and professors that are permanent employees of the given university, but were appointed at another university.

Note: *** The average age is calculated from the total number of newly appointed docents and professors at the given university (faculty or total number).

Note: **** The faculty or the constituent part of the university implement an accredited study programme.

Tab. 7.1: CTU involvement in international cooperation programmes (regardless of the source of funding)

CTU in Prague	HORIZON 2020/7th EC framework programme		Other	TOTAL
	TOTAL	Of which Marie-Curie Actions		
Number of projects*	61	4	44	105
Number of outgoing students**	65	0	165	230
Number of incoming students***	299	4	464	763
Number of outgoing academic staff****	167	0	1,334	1,501
Number of incoming academic staff*****	11	0	427	438
Grants in thousands of CZK******	145,990	8,558	61,630	207,620

Note: * Projects in progress in the given year.

Note: ** Outgoing students (i.e. number of departures) – students who studied abroad in 2019; students whose stay had started in 2018 are also included. Only students whose stay exceeded 4 weeks (28 days) are included. If the university includes also stays that lasted a different number of days, it shall state this fact in notes to the table.

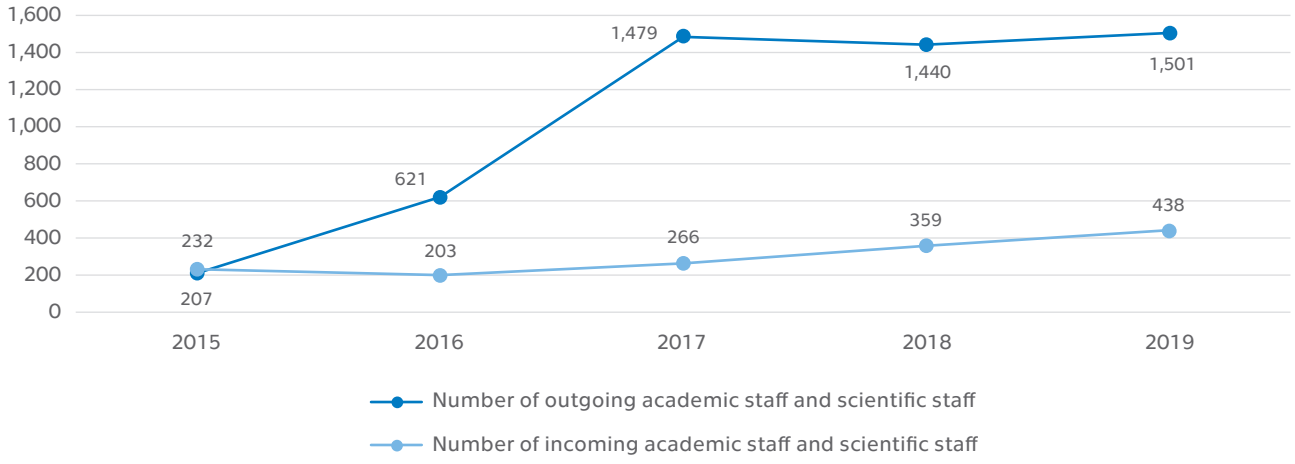
Note: *** Incoming students (i.e. number of arrivals) – students who studied in CR in 2019; students whose stay had started in 2017 are also included. Only students whose stay exceeded 4 weeks (28 days) are included. If the university includes also stays that lasted a different number of days, it shall state this fact in notes to the table.

Note: **** Outgoing academic staff (i.e. number of departures) – academics who worked abroad in 2019; academics whose stay had started in 2018 are also included.

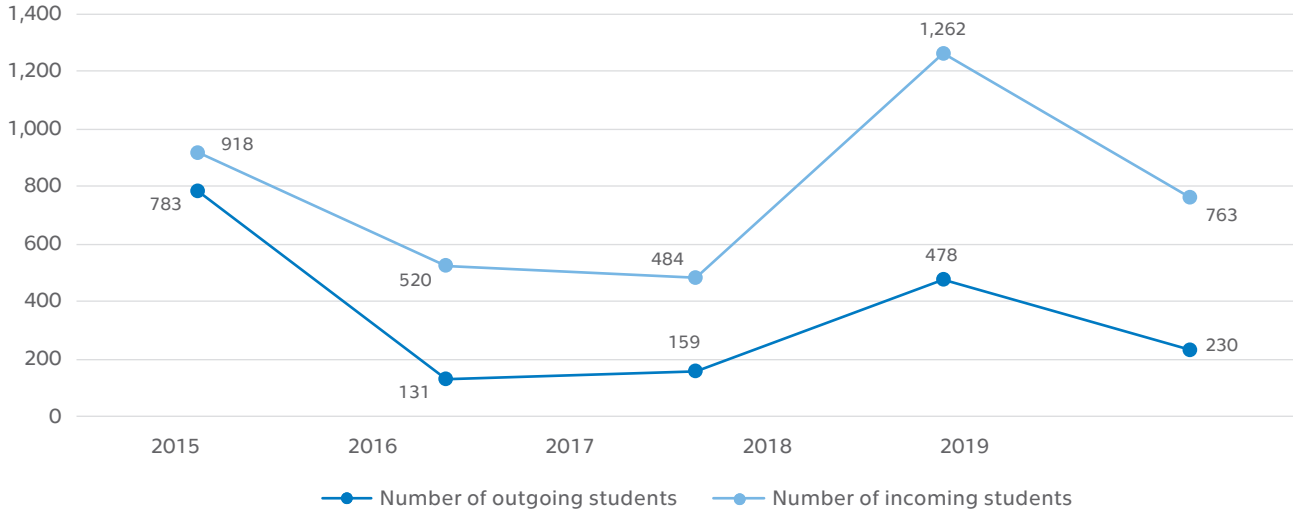
Note: ***** Incoming academic staff (i.e. number of arrivals) – academics who worked in CR in 2019; academics whose stay had started in 2018 are also included.

Note: ****** The given amounts represent overall financial resources of the projects, including co-financing from the Ministry of Education, Youth and Sports.

CTU INVOLVEMENT IN INTERNATIONAL COOPERATION PROGRAMMES – ACADEMIC AND SCIENTIFIC STAFF
(REGARDLESS OF THE SOURCE OF FUNDING)



CTU INVOLVEMENT IN INTERNATIONAL COOPERATION PROGRAMMES – STUDENTS
(REGARDLESS OF THE SOURCE OF FUNDING)



Tab. 7.2: Mobility of students, academic and other staff according to countries*****(regardless of source of financing)

CTU in Prague	Number of outgoing students*	
Country	Total	Of which practical training******
Afghanistan, Islamic Republic of	0	0
Albania, Republic of	0	0
Algeria, People's Democratic Republic of	0	0
Angola, Republic of	0	0
Argentine Republic	5	1
Armenia, Republic of	2	1
Australia, Commonwealth of	18	2
Austria, Republic of	4	1
Azerbaijan, Republic of	2	0
Bangladesh, People's Republic of	0	0
Belarus, Republic of	0	0
Belgium, Kingdom of	19	2
Bolivia, Plurinational State of	1	0
Bolivia, Plurinational State of	1	0
Bosnia and Herzegovina	1	0
Brazil, Federative Republic of	4	1
Bulgaria, Republic of	2	0
Cambodia, Kingdom of	0	0
Cameroon, Republic of	0	0
Canada	11	4
Colombia, Republic of	1	0
Costa Rica, Republic of	2	0
Croatia, Republic of	1	0
Cyprus, Republic of	0	0
Denmark, Kingdom of	8	1
Dominican Republic	0	0
Ecuador, Republic of	1	0
Egypt, Arab Republic of	1	0
Eritrea, State of	0	0
Estonia, Republic of	4	0
Ethiopia, Federal Democratic Republic of	0	0
Finland, Republic of	21	4
French Guiana	0	0
French Polynesia	0	0
French Republic	22	4
Georgia	1	0
Germany, Federal Republic of	72	24

Number of incoming students**	Number of outgoing academic staff***	Number of incoming academic staff ****	Number of outgoing other staff***	Number of incoming other staff****	TOTAL per country
1	0	0	0	0	1
2	0	0	1	2	5
1	2	3	0	0	6
3	0	0	0	0	3
5	7	4	1	0	22
4	1	1	1	1	10
8	17	8	1	2	54
5	48	61	9	2	129
30	2	2	0	1	37
2	0	0	0	0	2
91	4	1	1	1	98
11	32	41	8	5	116
1	1	0	2	0	5
3	2	5	1	1	13
17	4	1	1	1	25
10	22	14	2	2	54
8	6	5	2	2	25
1	0	0	0	0	1
1	0	0	0	0	1
12	44	58	4	2	131
5	4	6	4	3	23
2	1	1	1	1	8
2	17	12	4	2	38
1	14	2	4	4	25
5	27	34	7	4	85
2	0	0	0	0	2
3	2	1	1	0	8
11	1	1	1	0	15
1	0	0	0	0	1
1	2	2	0	1	10
2	0	0	0	0	2
11	34	42	4	4	116
1	0	1	0	0	2
1	0	0	0	0	1
143	98	101	9	7	380
6	2	4	6	2	21
52	128	191	14	4	461

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Tab. 7.2: Mobility of students, academic and other staff according to countries*****(regardless of source of financing)

CTU in Prague	Number of outgoing students*	
Country	Total	Of which practical training******
Gibraltar	0	0
Hellenic Republic	4	0
Hong Kong Special Administrative Region of the People's Republic of China	8	2
Hungary	2	0
Chad, Republic of	0	0
Chile, Republic of	2	0
China, People's Republic of	22	0
Iceland, Republic of	1	0
India, Republic of	4	0
Indonesia, Republic of	2	0
Iran, Islamic Republic of	0	0
Iraq, Republic of	0	0
Ireland	4	0
Israel, State of	2	0
Italian Republic	24	4
Japan	12	4
Jordan, Hashemite Kingdom of	0	0
Kazakhstan, Republic of	2	0
Kenya, Republic of	0	0
Korea, Republic of	27	4
Kosovo, Republic of	0	0
Kyrgyz Republic	0	0
Latvia, Republic of	2	0
Lebanese Republic	0	0
Libya	0	0
Liechtenstein, Principality of	0	0
Lithuania, Republic of	4	2
Luxembourg, Grand Duchy of	0	0
Macao Special Administrative Region of the People's Republic of China	2	0
Madagascar, Republic of	0	0
Malaysia	1	0
Malta, Republic of	0	0
Marshall Islands, Republic of the	0	0
Moldova, Republic of	1	0
Mongolia	0	0
Montenegro	1	0

Number of incoming students**	Number of outgoing academic staff***	Number of incoming academic staff ****	Number of outgoing other staff***	Number of incoming other staff****	TOTAL per country
1	0	0	0	0	1
17	7	14	2	7	51
3	2	1	4	1	19
4	22	24	7	2	61
1	0	0	0	0	1
5	4	2	4	0	17
117	34	36	7	17	233
1	2	2	1	1	8
149	11	41	4	2	211
5	7	7	4	2	27
7	2	2	0	0	11
5	1	0	0	0	6
1	4	6	4	1	20
5	28	47	2	2	86
31	47	57	14	4	177
3	43	52	7	2	119
5	1	0	0	0	6
248	18	48	9	5	330
1	0	0	0	0	1
27	47	48	4	4	157
3	1	2	2	2	10
17	2	4	2	6	31
2	7	9	4	5	29
5	2	4	2	1	14
1	0	0	0	0	1
0	6	4	4	2	16
8	8	7	4	3	34
1	4	0	4	1	10
0	1	1	1	1	6
1	0	0	0	0	1
4	7	6	5	2	25
0	4	0	4	1	9
1	0	0	0	0	1
15	4	5	2	2	29
4	0	0	0	0	4
3	7	3	1	1	16

>>>

Tab. 7.2: Mobility of students, academic and other staff according to countries*****(regardless of source of financing)

CTU in Prague	Number of outgoing students*	
Country	Total	Of which practical training******
Morocco, Kingdom of	0	0
Namibia, Republic of	0	0
Netherlands, Kingdom of	24	5
New Caledonia	0	0
New Zealand	4	0
Nigeria, Federal Republic of	0	0
North Macedonia, Republic of	1	0
Norway, Kingdom of	7	0
Pakistan, Islamic Republic of	0	0
Palestinian National Authority	0	0
Panama, Republic of	0	0
Paraguay, Republic of	0	0
Peru, Republic of	1	0
Philippines, Republic of the	0	0
Poland, Republic of	4	3
Portuguese Republic	31	4
Qatar, State of	0	0
Romania	2	0
Russian Federation	47	12
Saudi Arabia, Kingdom of	0	0
Senegal, Republic of	0	0
Serbia, Republic of	1	0
Seychelles, Republic of	0	0
Sierra Leone, Republic of	0	0
Singapore, Republic of	14	1
Slovak Republic	51	14
Slovenia, Republic of	4	0
South Africa, Republic of	2	0
Spain, Kingdom of	64	7
Sri Lanka, democratic Socialist Republic of	0	0
Sudan, Republic of the	0	0
Sweden, Kingdom of	28	4
Swiss Confederation	14	3
Syrian Arab Republic	0	0
Taiwan – Republic of China	28	4
Tanzania, United Republic of	0	0
Thailand, Kingdom of	0	0
Tunisian Republic	0	0

Number of incoming students**	Number of outgoing academic staff***	Number of incoming academic staff ****	Number of outgoing other staff***	Number of incoming other staff****	TOTAL per country
2	2	2	0	0	6
1	0	0	0	0	1
12	47	44	21	2	150
0	0	0	1	0	1
0	0	0	1	2	7
4	0	0	0	0	4
9	2	7	1	4	24
1	7	4	4	0	23
5	1	2	0	7	15
2	0	0	0	0	2
0	1	1	1	0	3
0	0	1	0	0	1
3	2	2	4	5	17
2	1	1	1	0	5
18	76	98	5	2	203
20	47	28	10	3	139
0	0	0	0	1	1
12	4	14	2	4	38
775	58	79	8	9	976
4	14	28	2	2	50
1	0	0	0	0	1
5	6	2	4	4	22
1	0	0	0	0	1
3	0	0	0	0	3
11	14	15	4	2	60
1,055	193	274	18	11	1,602
7	7	8	4	2	32
1	7	4	4	2	20
62	79	88	4	2	299
2	1	1	0	1	5
1	0	0	0	0	1
9	27	38	4	4	110
2	24	22	4	4	70
28	1	2	0	0	31
35	35	26	8	6	138
2	1	0	0	0	3
1	4	6	2	2	15
6	1	0	1	1	9

>>>

Tab. 7.2: Mobility of students, academic and other staff according to countries*****(regardless of source of financing)

CTU in Prague	Number of outgoing students*	
Country	Total	Of which practical training******
Turkey, Republic of	4	0
Ukraine	14	3
United Mexican States	42	8
United States of America	45	7
United States of America	68	7
Uzbekistan, Republic of	1	0
Vietnam, Socialist Republic of	1	0
Other countries		
TOTAL	**833**	**143**

Note: * Outgoing students (i.e. number of departures) – students who studied (completed studies) abroad in 2018; students whose stay had started in 2017 are also included. Only students whose stay exceeded 2 weeks (14 days) are included.

Note: ** Incoming students (i.e. number of arrivals) – students who studied in CR in 2018; students whose stay had started in 2017 are also included. Only students whose stay exceeded 2 weeks (14 days) are included.

Note: *** Outgoing academic/other staff (i.e. number of departures) – academics who worked (completed a stay) abroad in 2018; academicians whose stay had started in 2018 are also included. Only academics whose stay exceeded 5 days are included.

Note: **** Incoming academic/other staff (i.e. number of arrivals) – academics who worked in CR in 2018; academics whose stay had started in 2018 are also included. Only academics whose stay exceeded 5 days are included.

Note: ***** Table 12.3. Mobility of students, academic and other staff according to countries includes the list of all countries; the aim is to facilitate the processing of data acquired by the Ministry of Education, Youth and Sports. At the same time it should pose no problem for universities to fill the table in. In case there is no mobility from a given country, leave the box blank.

Note: ****** Practical training is a stay at a foreign company or organization lasting 2–12 months that starts after graduation from university and is completed within a year thereof. Practical training is organized based on a trilateral agreement between the student, the sending university and the host organization, institution, company.

Number of incoming students**	Number of outgoing academic staff***	Number of incoming academic staff ****	Number of outgoing other staff***	Number of incoming other staff****	TOTAL per country
48	14	8	7	4	85
395	27	72	7	2	517
30	14	29	5	5	125
21	68	77	14	4	229
32	58	66	8	11	243
13	7	14	4	2	41
18	3	0	2	0	24
					0
3,825	**1,708**	**2,097**	**362**	**241**	**9,066**

Tab. 7.3: Graduate mobility** (percentage of studies)

CTU in Prague	Bachelor study programmes	
	percentage	number
Faculty of Civil Engineering*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	9.0%	181.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Faculty of Mechanical Engineering*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	5.2%	76.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Faculty of Electrical Engineering*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	9.7%	174.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Faculty of Nuclear Sciences and Physical Engineering*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	4.6%	31.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Faculty of Architecture*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	1.2%	11.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Faculty of Transportation Sciences*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	1.3%	11.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Faculty of Biomedical Engineering*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	1.2%	12.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Faculty of Information Technology*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	1.2%	21.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
Masaryk Institute of Advanced Studies*		
Percentage and number of graduates who went abroad for at least 14 days during their studies [%]	0.9%	7.0
Percentage and number of Ph.D. graduates who went abroad for at least 1 month (i.e. 30 days) during their studies [%]		
CTU in Prague	**9.7%**	**524.0**

Note: * The faculty or the constituent part of the university implement an accredited study programme.

Note: ** Total numbers per faculty (last field in the upper row for each faculty) and per university (all empty fields per university in the structure of the Annual Report) are not a sum or an average of the data in the previous rows or columns. The values in these fields need to be calculated independently.

Master study programmes		Follow-up master study programmes		Doctoral study programmes		TOTAL**	
percentage	number	percentage	number	percentage	number	percentage	number
14.6%	73.0	14.8%	59.0	16.4%	68.0	11.4%	381.0
				15.9%	66.0	15.9%	66.0
7.8%	32.0	6.0%	24.0	7.8%	23.0	6.0%	155.0
				7.2%	21.0	7.2%	21.0
17.0%	68.0	13.8%	55.0	23.1%	71.0	12.7%	368.0
				21.5%	66.0	21.5%	66.0
15.0%	15.0	16.5%	16.0	11.7%	33.0	8.3%	95.0
				10.3%	29.0	10.3%	29.0
24.9%	78.0	26.0%	52.0	4.7%	6.0	9.2%	147.0
				4.7%	6.0	4.7%	6.0
8.7%	13.0	7.2%	10.0	6.4%	8.0	3.3%	42.0
				6.4%	8.0	6.4%	8.0
5.5%	11.0	5.9%	11.0	6.1%	8.0	2.8%	42.0
				5.3%	7.0	5.3%	7.0
21.0%	45.0	21.5%	43.0	11.3%	6.0	5.3%	115.0
				11.3%	6.0	11.3%	6.0
5.0%	10.0	6.0%	9.0	33.3%	1.0	2.4%	27.0
				33.3%	1.0	33.3%	1,0
17.0%	**345.0**	**13.8%**	**279.0**	**21.5%**	**224.0**	**7.7%**	**1,372.0**

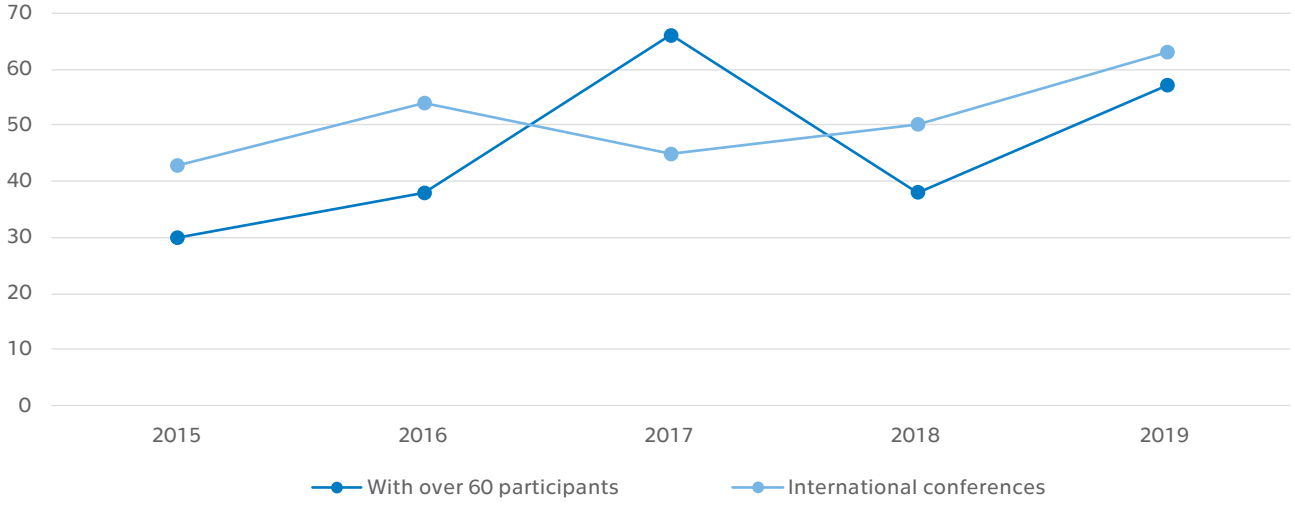
Tab. 8.1: Conferences (co)organized by university (number)

CTU in Prague	With over 60 participants	International conferences**
Faculty of Civil Engineering*	18	14
Faculty of Mechanical Engineering*	8	5
Faculty of Electrical Engineering*	3	4
Faculty of Nuclear Sciences and Physical Engineering*	4	12
Faculty of Architecture*	5	3
Faculty of Transportation Sciences*	0	1
Faculty of Biomedical Engineering*	4	3
Faculty of Information Technology*	6	7
Klokner Institute*	1	1
Masaryk Institute of Advanced Studies*	0	0
University Centre for Energy Efficient Buildings*	0	0
Czech Institute of Informatics, Robotics and Cybernetics*	7	10
Institute of Experimental and Applied Physics CTU*	1	3
TOTAL	**57**	**63**

Note: * The faculty or the constituent part of the university implement an accredited study programme.

Note: ** An international conference is a conference in which at least one foreign speaker participates and whose papers are at least in one of the following languages – English, French, German, or in a language related to the professional specialization of the conference, e.g. in case of philological disciplines.

CONFERENCES (CO)ORGANIZED BY UNIVERSITY



Tab. 8.2: Experts* from the application sector involved in teaching and practical trainings in accredited study programmes (numbers)

CTU in Prague	Persons who concluded a work agreement with university or its constituent part			Persons who concluded a work agreement with university or its constituent part		
	Number of persons involved in teaching	Number of persons involved in supervising theses	Number of persons involved in specialized internships***	Number of persons involved in teaching	Number of persons involved in supervising theses	Number of persons involved in specialized internships***
Faculty of Civil Engineering**	143					
Of which women	37					
Faculty of Mechanical Engineering**	58	11				
Of which women						
Faculty of Electrical Engineering**	30	90		4		8
Of which women	5	11				
FNSPE – BS – Application of natur. sc.**	23				36	
Of which women	11				18	
FNSPE – FMS – Application of natur. sc**	79		2	4	24	3
Of which women	39		1	2	12	1
Faculty of Transportation Sciences**	196	196		96	11	
Of which women	57	57		21		
Faculty of Biomedical Engineering**	97	51	15	0	0	38
Of which women	44	20	10	0	0	25
TOTAL	**626**	**348**	**17**	**104**	**71**	**49**
Of which women	193	88	11	23	30	26

Note: * Experts from the application sector involved in at least one third of the time schedule of at least one course or who act as supervisors of students' theses. In case the person is permanently employed by the university/faculty, they should have another job with at least the same FTE outside the university/faculty.

Note: ** The faculty or the constituent part of the university implement an accredited study programme.

Note: *** These are individuals who are directly responsible for a student's practical training.

Tab. 8.3: Fields of study/study programmes*** whose content includes compulsory practical training** lasting at least 1 month* (numbers)

CTU in Prague	Number of fields of study/ programmes****	Number of active studies					
		Bachelor study programmes		Master study programmes		Follow-up master study programes	
		Academic profile	Professional profile	Academic profile	Professional profile	Academic profile	Professional profile
Faculty of Civil Engineering**	1		63				
Faculty of Mechanical Engineering**	1					56	
Faculty of Biomedical Engineering**	8		7				1
TOTAL	**10**		**70**			**56**	**1**

Note: * The duration of individual compulsory practical trainings may be shorter, but the total duration must be at least one month.

Note: ** The faculty or the constituent part of the university implement an accredited study programme/field of study.

Note: *** Compulsory practical training is a practical training that is part of the accreditation of the given field of study; it can be part of one of the subjects or it can be an independent subject. It is a specialized practical training.

Note: **** The university will insert the data related to the lowest accreditation unit – in proportion, a field of study, unless a study programme is divided into fields of study, and also the data relevant for the study programme.

Tab. 8.4: Transfer of knowledge and research outcomes to practice

CTU in Prague				
	In CR	Abroad	TOTAL number	TOTAL revenues
Number of spin-off/start-up companies*				
Submitted patent applications	41	16	57	
Granted patents**	45	9	54	
Registered designs	71		71	
License agreements in effect as on 31 December	22		22	
Newly concluded licence agreements	8	3	11	CZK 439,543
Contractual research***, consultations and advisory***			5,822	CZK 389,965,669
Paid educational courses for employees of entities from the application sector***			41	CZK 1,162,310

Note: * Newly established spin-off/start-up companies supported by the university in 2019 (numbers).

Note: ** In case of a European patent, the patent is reported only once in the section "Abroad" regardless of the number of designated countries.

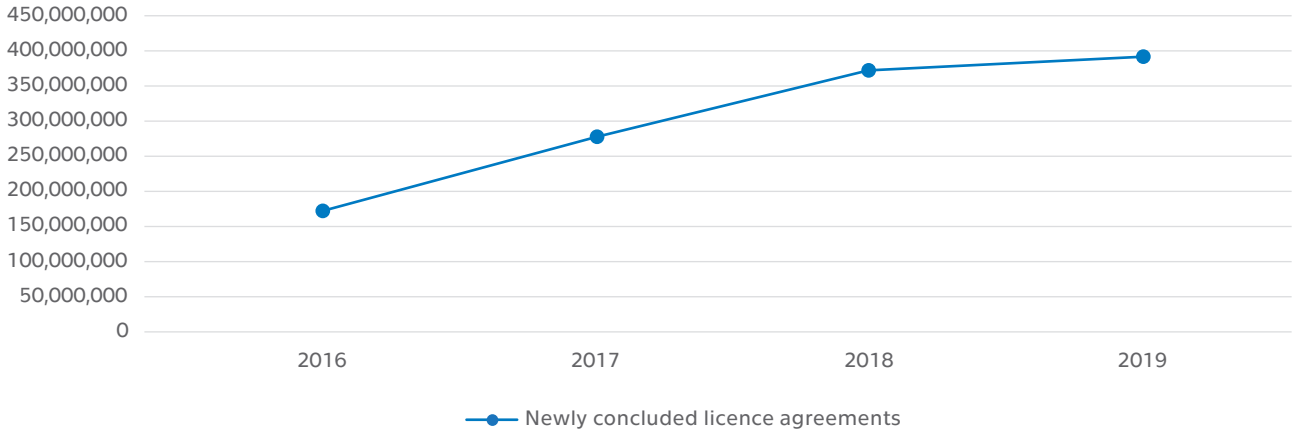
Note: *** The definition of items related to revenues and the items' value in the table is in line with the 2018 annual report on finance of the university (Tab. 6). SVŠ will complete these items upon discretion.

A licence agreement is defined as granting a right in the agreed scope and on the agreed geographical territory to acquire or grant a licence for one type of protection of intellectual and industrial property. Licence agreements are concluded in writing for patented inventions, or registered utility models, registered designs, topography of semiconductor products, new plant varieties and animal breeds or registered marks. The licensor authorizes the licensee to exercise intellectual and industrial property rights in the agreed scope and on the agreed geographical territory, and the licensee pledges to provide payment (licence fees) or other assets. The licensee cannot be prosecuted by the licensor for breach of intellectual property rights or copyright.
Contractual research is commissioned research that is based on cooperation (interaction) that specifically meets the research needs of entities in the application sector, and the university implements it for the entity in the application sector in accordance with its requirements and needs. The university receives payments for this research from the entity. Typically, it includes bigger projects, original research and a written report. Commissioned research is usually commissioned by a concrete external organization (for its use). It does not matter whether the financial resources that the entity in the application sector paid for such contractual research came from public or private sources. Cases when the university is a recipient of special-purpose support for applied research are not to be considered as contractual research.
Paid educational courses enhance the qualification of employees of entities in the application sector (e.g. company educational courses). Entities in the application sector are legal entities whose core activity is not research and development. These include businesses, public administration bodies, NGOs, etc. – always provided research is not their core activity. The revenues of such educational courses will be included that are "commissioned", i.e. following an agreement with the organization in question and for its employees. This is not equal to costs incurred by participants in educational courses employed by the company that falls under the above definition. On the contrary, these are courses that have been devised based on an agreement with the given company which wanted to provide training for its employees.
Consultations and advisory refer to providing expert advice, opinion or activity that rely on a high level of intellectual inputs from the university institution towards the client. The university provides consultation and advisory services to entities in the application sector against payment and under market conditions. The main required outcome of the consultation is not the creation of a new piece of knowledge, but understanding or comprehension of a certain state.

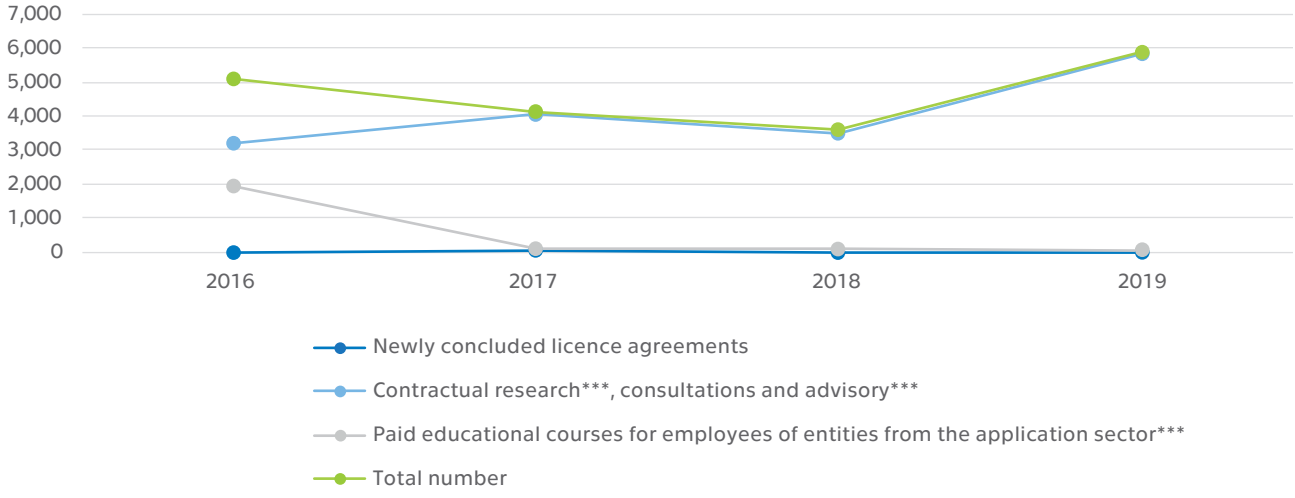
Summarized information for Tab. 8.4

	Total number	Total revenues
Newly concluded license agreements, contractual research, consultations, advisory and paid educational courses for employees of entities from the application sector	5,874	CZK 391,567,522
	Average revenue per contract	
	CZK 66,661	

TRANSFER OF KNOWLEDGE AND RESEARCH OUTCOMES TO PRACTICE (TOTAL REVENUES IN CZK)



NEWLY CONCLUDED LICENSE AGREEMENTS, CONTRACTUAL RESEARCH, CONSULTATIONS, ADVISORY AND PAID EDUCATIONAL COURSES FOR EMPLOYEES OF ENTITIES FROM THE APPLICATION SECTOR



Tab. 12.2 University libraries	
CTU in Prague	**Number**
Increase in the library collection in 2019	4,928
of which increase in physical units	4,672
of which increase in e-books in permanent ownership	256
Library collection in total	488,068
of which increase in physical units	485,171
of which increase in e-books in permanent ownership	2,897
PNumber of subscribed periodicals: – physical	284
– electronic (estimated)*	7
– in both formats**	0

Note: * Only titles of periodicals for which the library has a subscription (or obtains as a gift or in exchange) in paper or electronic format are included; this table does not include other periodicals that library users can access through consortia of full-text sources.

Note: ** The number of titles in both formats consists solely of titles, where both formats are paid for independently (i.e. in case the subscription is for the paper format and the electronic format is a free bonus, only the paper format is included, etc.)

Note: Electronic units include only titles acquired individually, and do not include books and periodicals that are part of subscribed "packages" from publishers of specialized and scientific books.

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