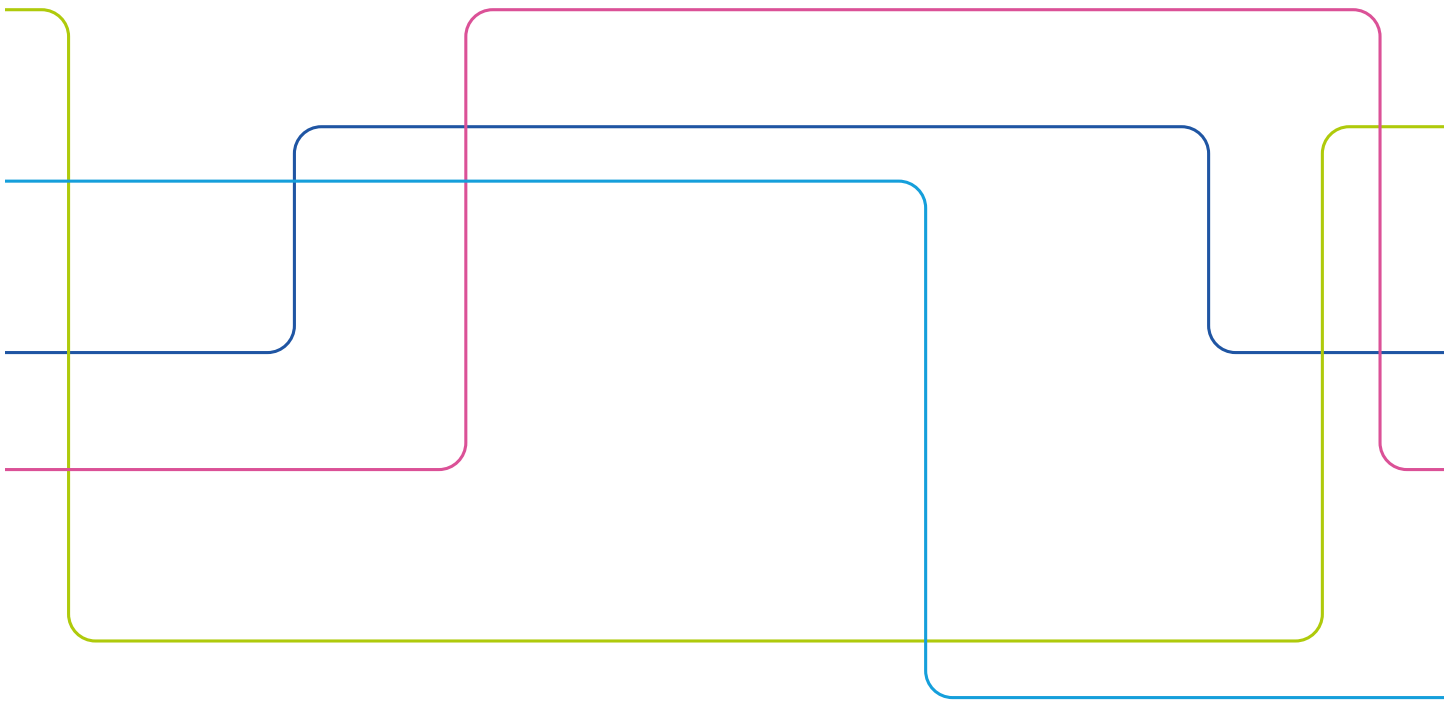




# Annual Report 2019



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# About the Annual Report

KTH's annual report is governed by the Ordinance concerning the Annual Reports and Budget Documentation (2000:605). The Annual Report will give a true and fair view of the organisation's result.

The content of the Annual Report consists not only of information that KTH has to report according to the law and government assignments, but also other information that KTH has chosen to provide about its activities in general and things that have taken place in 2019 in particular.

Reporting requirements as a result of regulatory letters or other decisions are published on a grey background to make them more visible.

Quantitative data about volume and development are

mainly derived from KTH's business system. Quantitative data in the text is often specified in the form xx (yy), where xx is the information for 2019 and yy is the corresponding information for 2018.

Qualitative data regarding operations and development are mainly derived from decisions, reports, information on KTH's website, etc.

The Annual Report has been compiled within KTH's University Administration.

KTH's annual report uses a large number of abbreviations. In order to avoid having to explain them all in the body of the text, the most important ones are listed here.

## KTH internally

<b>ABE</b>	School of Architecture and the Built Environment
<b>CBH</b>	School of Engineering Sciences in Chemistry, Biotechnology and Health
<b>EECS</b>	School of Electrical Engineering and Computer Science
<b>ITM</b>	School of Industrial Engineering and Management
<b>SCI</b>	School of Engineering Science
<b>GVS</b>	University Administration
<b>SciLifeLab</b>	Science for Life Laboratory
<b>GA</b>	Director of First and Second Cycle Education
<b>FA</b>	Director of Third Cycle Education
<b>PA</b>	Programme Director
<b>FYS</b>	Full year student
<b>FYP</b>	Full year performance
<b>SRA</b>	Strategic research area
<b>THS</b>	Student Union at the Royal Institute of Technology

## Higher education institutions

<b>KI</b>	Karolinska institutet
<b>SU</b>	Stockholms University
<b>UU</b>	Uppsala University
<b>SH</b>	Södertörns University
<b>MIUN</b>	Mid Sweden University
<b>MDH</b>	Mälardalen University
<b>HHS</b>	Stockholm School of Economics
<b>GIH</b>	Swedish School of Sport and Health Sciences

## Authorities, organisations

<b>UKÄ</b>	Swedish Higher Education Authority
<b>UHR</b>	Swedish Council for Higher Education
<b>VR</b>	Swedish Research Council
<b>Vinnova</b>	Swedish Governmental Agency for Innovation Systems
<b>EIT</b>	European Institute of Innovation and Technology
<b>KIC</b>	Knowledge and Innovation Communities (inom EIT)

# This is KTH

Since its founding in 1827, KTH Royal Institute of Technology in Stockholm has grown to become one of Europe's pre-eminent technical and engineering universities, as well as a key centre of intellectual talent and innovation. As Sweden's largest provider of technical education and research, KTH attracts students, teachers and academic researchers from all corners of the globe.

KTH works closely with industry and society in general in the pursuit of sustainable solutions to some of humanity's greatest challenges: climate change, future energy supplies, urbanisation and quality of life for an aging population.

Education and academic research at KTH cover a very wide area – not only in science and technology, but also within the fields of architecture, industrial economics, urban planning and education, for instance. Our innovative climate promotes versatile solutions and facilitates the creation of a new generation of engineers, architects and teachers. Over the next few years, extra focus will be placed on digitalisation, sustainability, internationalisation and gender equality.

KTH participates in international research collaborations and conducts a large number of educational exchanges and study programmes with universities and other institutions of higher education all over the world. KTH's joint collaborations with strategic partners, such as business enterprises, govern-

mental authorities and non-profit organisations, provide our students and researchers a wide network of contacts to take advantage of.

KTH's educational and research activities are distributed across five campus areas in the Stockholm region. KTH's central campus is in the centre of Stockholm, next to Norra Djurgården. KTH and Stockholm University jointly organise educational programmes and research in biotechnology and physics at AlbaNova, near Roslagstull, and adjacent to KTH Campus.

Karolinska Institutet Science Park in Solna is home to the Science for Life Laboratory (SciLifeLab), which is operated together with Karolinska Institutet, Stockholm University and Uppsala University. Education and research in the field of information technology are conducted in Kista in northern Stockholm, close to companies and research institutions involved in the sector.

With a focus on medical technology, KTH is a part of Campus Flemingsberg in the southern suburbs of Stockholm. In Södertälje, KTH is expanding its offerings in education and research in sustainable production. In collaboration with Scania, AstraZeneca and Södertälje Municipality, KTH is a key partner in Södertälje Science Park.

## KTH in figures 2019

### Educational activities

- Master of Architecture and 16 Master of Science in Engineering programmes
- Master of Science in Engineering combined with Degree in Education
- 9 Bachelor of Science in Engineering programmes
- Bridging Teacher Education Programme
- Master's programmes (one and two year)
- Bachelor's programmes and two-year university diplomas
- Further education, technical preparatory year/semester
- 13,514 full time students, of which 34 per cent are women and 66 per cent men (including fee-paying students)
- 11,407 annual performance equivalents (including fee-paying students)
- 1,665 active research students (at least 50 per cent activity), of which 32 per cent are women and 68 per cent men
- 2,418 new students on the first year of Master of Science in Engineering, Master of Architecture and Bachelor of Science in Engineering programmes of which 33 per cent are women and 67 per cent men
- 720 admitted to the Technical Preparatory Year/Semester, of which 30 per cent are women and 70 per cent men
- 2,465 new students on one and two-year Master's programmes, 35 per cent women and 65 per cent men, of whom  
*1,207 students previously on Master of Science in Engineering studies programmes and 1,185 students studying on a one or two-year Master's programme at KTH*
- 333 newly-admitted students to doctoral studies programmes, of which 37 per cent are women and 63 per cent men
- 114 Master of Architecture, 57 per cent to women and 43 per cent to men
- 1,150 Master of Science in Engineering degrees, 35 per cent to women and 65 per cent to men
- 267 Bachelor of Science in Engineering degrees, 32 per cent to women and 68 per cent to men
- 2,012 Master/Master of Science (one and two-year) degrees, 34 per cent to women and 66 per cent to men
- 245 PhDs, 32 per cent to women and 68 per cent to men
- 46 licentiate degrees, 28 per cent to women and 72 per cent to men

### Research

Primary responsibility for five national strategic research areas;

- E-science
- IT and mobile communication
- Transport research
- Production engineering
- Molecular biosciences (Science for Life Laboratory)
- Partner in another five areas

Lead partner in five programme areas within the European Institute of Innovation and Technology (EIT);

- EIT InnoEnergy
- EIT Digital
- EIT Health
- EIT Raw Materials
- EIT Urban Mobility

External financing, income from grants, 1,807 MSEK (excluding transfers):

- MSEK 276 the Swedish Research Council
- MSEK 256 EU
- MSEK 169 Vinnova
- MSEK 223 Wallenberg Foundations
- MSEK 440 other government agencies
- MSEK 443 other external financing including private funds

### Financial situation

MSEK 5,566 in total turnover (of which MSEK 605 transfers)

Government grants (excluding transfers);

- MSEK 1,180 First and second level (undergraduate) educational programmes
- MSEK 1,229 Research and third education cycle

### Employees

- 5,044 employees, the equivalent of 3,760 full time positions, of which 1,492 are women and 2,268 men of which;  
*317 professors, 58 women and 259 men (including visiting and adjunct professors)*  
*287 associate professors, 71 women and 216 men*

### Floor space

- 284,000 m<sup>2</sup>

# Organisation

KTH's education and research are organised into five schools. Under each of the Schools, there are a number of departments, institutions, competence centres and study programmes. All of the Schools report directly to the President. Each School is led by a Head of School and a Deputy Head of School, and has a Management Group. There is also a Strategic Council for each School, which is an advisory body to the Head of School in relation to certain issues.

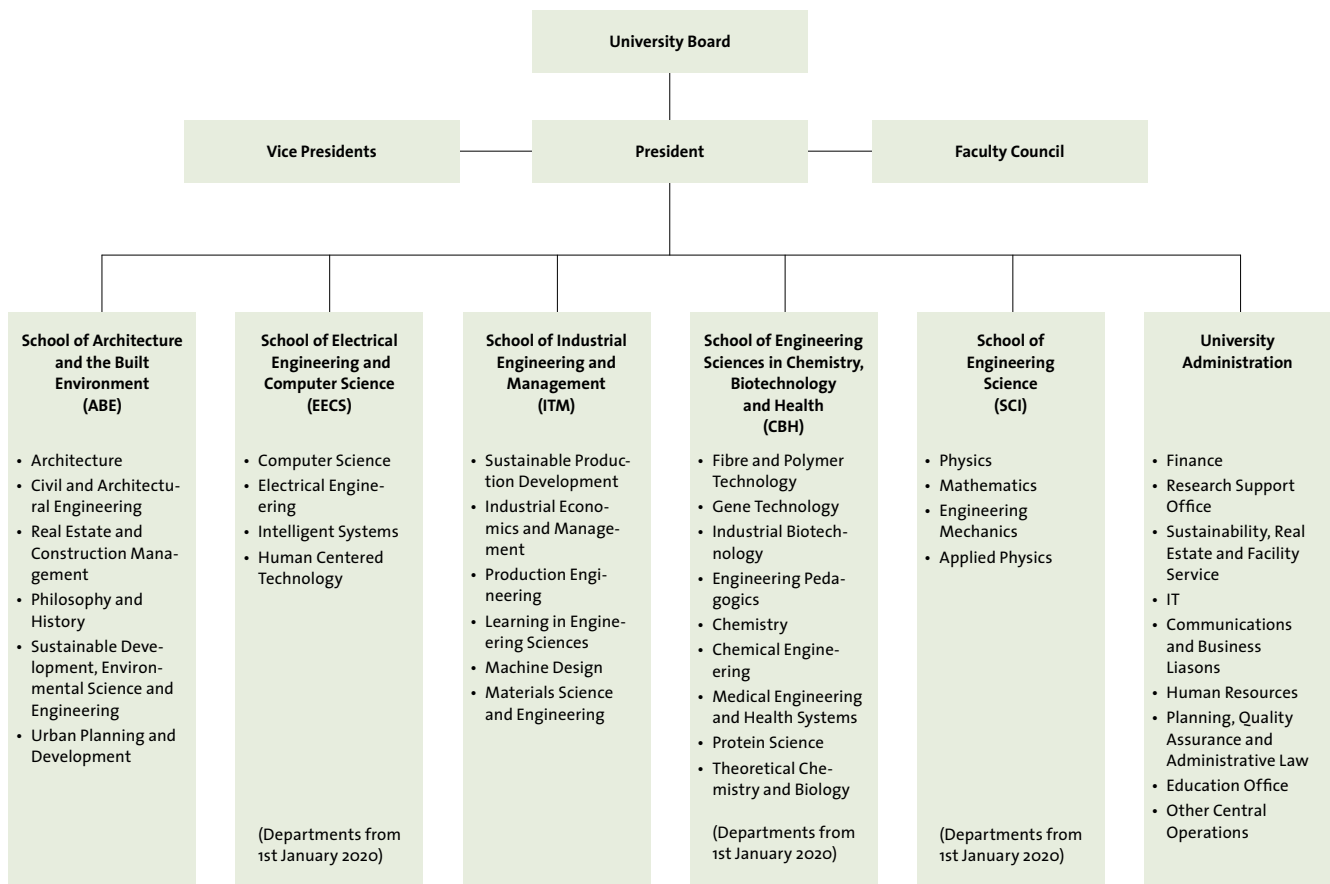
The University Board monitors all of KTH's internal affairs and is responsible for ensuring that its responsibilities are fulfilled. The Board consists of 15 members: the President, eight external members, three faculty members and three student representatives.

The President leads the University's activities, under the direction of the University Board. The Deputy President acts as the President in the event of absence. There are also Vice Presidents for Digitalisation, Research, Sustainable Development, International Affairs, Equality and Values, as well as Education.

The President has a Strategic Council that deals with strategic issues that concern all Schools and acts as an information and discussion forum. The Strategy Council

comprises the President, Deputy President, Dean of Faculty, Vice Dean of Faculty, all Heads of Schools, University Director, Communications Director and two student representatives. There is also a President's Management Council that supports the President in managing strategic issues and other overarching issues. The President's Management Council consists of the President, Deputy President, Vice Presidents, Dean of Faculty, Vice Dean of Faculty, University Director and the Chairperson of the Student Union. In addition there is a Heads of School Council made up of the President, Deputy President, all Heads of School and the University Director. The Heads of School Council deals with school-specific issues.

The Faculty Council is a university-wide body for KTH's work on quality development and collegial foundation. The Faculty Council has overall responsibility for developing the quality of education, research and joint collaborations, as well as in recruitment and promotion process for appointments to teaching staff. The majority of members are scientifically skilled and are appointed through elections among teaching staff and researchers. The Council is also an advisory body to the President.



# A note from the University President

Picking out a few of the research initiatives, collaborations and figures that do justice to the past year and KTH is no easy task. Quality, climate and competitiveness are words that spring to mind, however. An annual report is not only an exciting summary of the organisation – it also reflects KTH's role in social development.

The Annual Report can also be read on the basis of the four pillars we work by and that permeate our education, research and cooperation. These pillars and the figures for 2019 are a solid foundation to build on for the future and to develop KTH.

## ***Sustainable development***

A great deal has happened during the year and, in accordance with our new climate goals, KTH is at the forefront of climate adaptation. Our objectives involving education, research, collaboration and in-house emissions are far-reaching and will apply for the next 25 years.

Working alongside Chalmers, we have initiated the Climate Framework, to which the vast majority of Sweden's universities and other institutions of higher education have signed up. The fact that KTH came seventh in the world in the THE University Impact Rankings, which are based on the social impact of universities in relation to the UN Global Sustainable Development Goals, is very gratifying.

## ***Internationalisation***

It is clear that global relations are crucial to KTH's place in the world. KTH continued to attract many international students, around 1,000, and nearly 700 students from KTH chose to study abroad. KTH also took another step in the European educational and research environment, for example through its role as one of the European Universities. UNITE!, the University Network for Innovation, Technology and Engineering, will work to create greater mobility for students and staff between different institutes of higher education around Europe.

Within Horizon 2020, THE EU's framework programme for research which ends this year, KTH has received more projects so far than any other Swedish university.

The Stockholm Trio University Alliance, which was launched in early summer, is made up of KTH, Karolinska Institutet and Stockholm University. As part of the enhanced collaboration, the decision was also taken regarding

joint representation in Brussels in order to increase Stockholm Trio's visibility and influence in Europe.

KTH can also add a new strategic partner in India – the Indian Institute of Technology Madras – to the list of international collaborations, which is very exciting.

## ***Digitalisation***

KTH's major digitalisation initiative, KTH Digital Futures, was launched at the end of the year. This initiative brings together interdisciplinary projects in order to develop future technology for digitalisation, where KTH aims to assume greater responsibility for digital development in society.

The foundations for KTH Digital Futures were laid through our work in the ICT TNG (Information and Communication Technology the Next Generation) strategic research area. The research work in this area has had a major impact on scientific developments over the last decade. This is also reflected in the many external grants that the research has managed to generate during the year.

## ***Equality and values***

Systematic work to create a more equal KTH has been conducted through a number of activities at various levels within KTH's organisation, relating to staff, faculty and students. KTH, along with Karolinska Institutet and Malmö University, has initiated a research and collaboration programme intended to combat sexual harassment and gender-based vulnerability.

Fast-forwarding through the past year, there is much to be pleased about – and I would like to take this opportunity to mention a couple more things: our third-cycle education has become increasingly popular, and KTH has been very successful when it comes to apply for and receiving external research funding.

The close cooperation with our committed students through THS is also worthy of a mention. This bodes well for the future.



*Sigbritt Karlsson, President of KTH*

# The students have the floor

The Student Union of the Royal Institute of Technology (THS) has been working for more than a hundred years to provide the students at KTH with the best possible preconditions for a positive period of study, both in terms of the design of their education and in their everyday life and free time around their studies. Every year, many activities are organised to generate community, development and happiness. An important part of this is the orientation reception, where hundreds of students are involved in introducing the newcomers to student life. The orientation reception plays an important role in introducing students to what the Student Union is and what it can do for them.

All students at KTH will have some form of reception, but there are major differences in terms of the introduction you get depending on the level at which you start studying. The introduction is tricky for doctoral students as they are usually both employees and students, they start at different times of the year and they are scattered throughout the whole of KTH. The fact that doctoral students don't know what THS does is a significant problem, as we need their involvement in order to represent all students successfully. In this respect, KTH and THS need to pull together in order to create better forms of introduction.

For THS, the fact that the students leading the work are regularly replaced represents a challenge, although we also have processes to ensure positive transitions. Following the change in KTH's management in 2019, it has been interesting to see which issues still remain and which do not. Some of our issues are receiving more attention, while others are receiving less. 2019 has largely been a matter of orienting ourselves in a changed KTH, and this work is continuing.

One issue that THS has long been working on relates to anonymous examinations. Although there have been small steps in the right direction for several years, there is a sense of frustration that students still have to enter their name and personal ID number when submitting their examinations. A lot has happened during the year in respect of this issue, and

we hope and believe that 2019 will be the last year we need to deal with questions about what is actually happening with regard to anonymous exams.

A large part of the commitment to education issues is born precisely out of the frustration that things are not working satisfactorily. At times this relates to the quality of the teaching, but often it is more about the administration surrounding the education. There is a lack of information, things are messy and you don't get answers to your questions. This creates a great deal of stress and anxiety at the expense of individuals' studies. THS welcomes the work that KTH is doing to arrange operational support more effectively, and hopes that the work will continue in the same direction.

One significant area of focus in 2019 has been the Swedish Higher Education Authority's (UKÄ) review of KTH's quality assurance system. THS has been heavily involved in this, both in the self-assessment work and in the writing of a Student Union submission, as well as by participating in site visits. The student voice has really been heard, in our opinion, and the work that our student representatives have put in has been appreciated.

One reflection on the part of the Student Union in respect of the quality assurance work is that it is easy to stop structuring and organising when it comes to quality work. It is important for such structures to be in place, but they are meaningless unless there is joint acceptance of responsibility in the organisation. Student representatives are often disappointed that the management frequently comes out with positive statements, but that nothing happens in reality. This is the strength and weakness of the academic culture – the questioning and the independence that at the same time have to pull together in order to make progress in the work towards high quality.

*Elisabet Lökvist, Chairperson of the Student Union  
at the Royal Institute of Technology*



# Education

## First-cycle and second-cycle education

### Educational offerings

KTH's range of educational courses and programmes are characterised primarily by courses given as a part of a programme leading to an academic degree. Less than two percent of KTH's total educational volume is given in the form of freestanding courses. The prioritisation as regards the range of educational offerings is therefore made between programme and types of programmes. Prioritisations and assessments are based primarily on demand from the students, the needs of the labour market, and KTH's particular expertise. Internationalisation is also a central goal that affects the educational offerings.

Representatives of the labour market can be found in several of the strategic councils and programme councils that exist within each School at KTH, where they have the opportunity to express their perspectives and opinions. External representatives are also present in the Faculty Council and the University Board. In these groups, regular discussions are held on which educational programmes are regarded as necessary in the society and which are in demand by e.g. commercial enterprises, public authorities and organisations. More specific discussions are also conducted within the strategic partnerships that KTH maintains with a number of companies, authorities and organisations. See the *Collaborations section*.

KTH's ceiling amount was increased in 2019. One explanation is the Swedish Government's extension of engineering education and the Government's investment in urban management. Another explanation is the investments in Södertälje.

The Swedish Government's investment in the built environment and urban management is meeting society's intense demand for educated persons within this sector. KTH is conducting an ongoing dialogue with representatives of various stakeholders in the sector via the strategic councils that exist within the School of Architecture and the Built Environment. The strategic councils have external representation from e.g. the business sector and governmental authorities. The educational programmes within field of the built environment have a relatively high application demand, and KTH is therefore trying to adapt the educational volumes accordingly. KTH already has a large educational volume in this area, both in the form of educational programmes leading to vocational degrees and educational programmes leading to general degrees. Architecture education obtained additional slots in 2017, which is in line with the Swedish Government's focus.

As KTH has, for a number of years, produced programmes and courses over and above that for which the university is paid, KTH is planning for more or less the same number of full-time equivalent students in 2020 as in 2019. For 2019, KTH has achieved an outcome on a par with the ceiling

amount. KTH had already reduced the volume of freestanding courses and incoming exchange students.

The shortage of teachers is significant in certain scientific and technical subjects. KTH has therefore started up a programme leading to the Degree of Master of Science in Secondary Education in Södertälje in the autumn of 2019. In the recruitment work in preparation for future admission application rounds, this is one of the educational programmes that will be prioritised. Special efforts are needed to make the educational programme more widely-known and attract a greater number of interested applicants. In 2019, the programme had only six new students. Prior to decisions concerning this educational programme, discussions have taken place together with companies in Södertälje and the Municipality of Södertälje. The discussions with the municipality are of particular importance, bearing in mind the need for places for the practical internship element of the teacher training programme.

KTH is also responding to the considerable need for trained teachers by conducting supplementary teacher training together with Stockholm University. In 2015, KTH was commissioned to start up and conduct supplementary teacher training. The first round of the educational programme commenced in June 2016. In addition, KTH, also together with Stockholm University, has been commissioned to start up supplementary teacher training for individuals with a doctoral degree. This educational programme commenced for the first time in January 2017. KTH has already been providing an educational programme in engineering and education, leading to both a Degree of Master of Science in Secondary Education as well as a Degree of Master of Science in Engineering. See the *Teacher education programmes section*.

### *KTH's investment in sustainable production in Södertälje*

In June 2014, an agreement was presented between KTH, the Swedish Government, the Municipality of Södertälje, Scania, AstraZeneca and the company Acturum regarding an education and research initiative in Södertälje. One of the aims of the initiative is to strengthen the competitiveness of Swedish industry through cutting-edge education and research. The agreement includes an investment in four new educational programmes, with the aim of doubling the number of educational places on KTH's campus in Södertälje in the long term. All four of these programme have now started.

In the agreement with the Swedish Government concerning the investment in Södertälje, it is stated that KTH's ceiling amount is increasing from 2018 in order to facilitate the expansion. The new courses have been developed in collaboration with industry in Södertälje, and several of the courses are also being carried out in close collaboration with the business community.

In the autumn term of 2019, 34 students (33 in 2018) started on the Degree of Master of Science in Engineering with a

major in Industrial Engineering and Sustainability. At the same time, 13 students started as the first batch on the two-year Master's programme in Sustainable Production Development. This programme is closely linked to the growing research activities at KTH Södertälje and the industry in the regions.

In addition, 23 students (32) started on the programme leading to the Degree of Master of Science in Engineering with a major in Industrial Engineering and Production Maintenance.

The Autumn term 2019 also saw the start of an educational programme leading to a Degree of Master of Science in Secondary Education with a specialisation in technology, grades 7–9. The programme is given as a combination educational programme and leads to the Degree of Master of Science in Secondary Education with a specialisation in technology and mathematics as well as a Degree of Bachelor of Science in Engineering. Six students started on this new programme, which is largely studied together with the major in innovation and design on the programme leading to the Degree of Bachelor of Science in Engineering with a major in mechanical engineering, and with the scientific core of the education within existing supplementary teacher training.

At KTH Södertälje, 80 students also started the Degree of Bachelor of Science in Engineering with a major in mechanical engineering, and 137 students began the access programme, Technical Preparatory Year.

### Recruitment of students to KTH's programmes starting at first cycle

Technical education should be presented as a natural choice for young people who want to contribute to sustainable societal development. KTH has a communication platform that sets out what KTH should communicate to potential students. It also forms the basis of the activities and measures planned or begun to achieve a more balanced gender distribution, reduce social imbalance in recruitment and stimulate ethnic diversity. KTH also conducts long-term work with young people in lower secondary school as the target group.

Recruitment work prioritises the personal encounter between representatives of KTH and potential students. This is accomplished primarily by approx. 45 "student ambassadors", who are KTH's representatives in the interaction with upper secondary school pupils. These student ambassadors represent most of KTH's degree programmes and campuses. The student ambassadors reflect the diversity at KTH in terms of gender, geographic origins, ethnicity and social background. They are chosen with great care, with a high priority being their ability to inspire young people. All student ambassadors receive training in communicating with young people, presentation techniques, messages for student recruitment and specific information about the target group, as well as individual coaching.

In 2019, KTH's student ambassadors held 110 student recruitment meetings with upper-secondary school classes in the form of study visits to KTH and visits to upper secondary schools.

A target group survey shows that just over half of the students in year 3 of the science and technology programme, with a minimum of a 16 merit rating in their upper secondary school grades, have participated in personal meetings with KTH in one form or another. Based on the activity evaluations carried out, it can be concluded that KTH meets 26 percent of all pupils in year 3 in a science or technical programme at SACO's Student Fair in Stockholm, as well as 16 percent at the student ambassadors' upper secondary school visits and visits to campuses.

KTH's website, the course and programme offering catalogue and personal meetings, such as visits to upper secondary schools, are the most important channels for reaching the target audience with information prior to their selection of a programme. In order to establish opportunities to make KTH accessible to more people, irrespective of where they happen to live, the website, along with other digital initiatives such as social media and student blogs, is a very important component.

In 2019, extensive work has been carried out to make it possible for prospective students to be able to compare KTH's various programmes with each other. This work is conducted together with KTH's Director of First Cycle Education and is a direct result of a systematic evaluation of KTH's website. During the year, a review was also carried out of the programme information for all first cycle education.

Each year, KTH organises an open house for the purpose of disseminating information about KTH's educational programmes, on site in the University environment. The 2019 event attracted around 1,300 visitors, and according to the visitor survey that was conducted, the vast majority reported that they felt they had received adequate answers to their questions.

During KTH's student recruitment activities, around half of the participants are women. The same applies to KTH's direct target audience, 3rd year upper secondary students in science and technical programmes. At present, the greatest challenge in terms of recruitment of incoming students is that certain specialisations and educational environments still have a distinct imbalance between men and women. The work of recruiting women has therefore to some extent been redirected towards the subject areas and programmes with the greatest imbalance.

Over the past five years, KTH has conducted an initiative under the name "Giants" for the purpose of increasing the number of women students in programmes in computer engineering, IT and electrical engineering, by providing inspiration and more in-depth knowledge in these subject fields. In 2019, "Giants" had 230 female participants. In 2019, 39 former "Giants" participants have applied to programmes

in computer technology/IT/electrical engineering at KTH. During the period 2015–2018, workshops under the name of “Tekla” have been arranged each year with the aim of raising interest in engineering among girls. In 2019, a Tekla Festival was organised at KTH’s campus in Södertälje, with 250 participants aged between 11-15. In cooperation with the Swedish Institute and the Swedish Embassies, KTH has also arranged three events in the USA, Brazil and India. This concept is under development and will in the future contain more targeted efforts for the target audience.

KTH is working to increase knowledge and interest in technology, science and mathematics among children and young people. The hub of this work is Vetenskapens Hus (The House of Science), which is run by KTH and Stockholm University, with the City of Stockholm as a long-term partner. School pupils from lower secondary and upper secondary school visit AlbaNova and the Bergius Botanic Garden to perform experiments and activities involving biology, physics, chemistry, mathematics and technology. Advanced teacher training in these subjects is also offered. Vetenskapens Hus also hosts a wide range of other initiatives with a focus on increasing knowledge and interest in technology, science and mathematics. These include, for instance, Technology Week, Researchers’ Night (on Fridays) and First Lego League. Vetenskapens Hus hosts more than 80,000 visitors (pupils and teachers) each year.

### **Recruitment of students to second-cycle study programmes**

KTH’s Development Plan makes it clear that the recruitment of qualified students must take place both nationally and internationally, and that international visibility is essential for KTH’s brand. A significant number of tuition-paying students is a measure of KTH’s strong position internationally, and further efforts must be made to strengthen the quality within this area.

#### ***Focus during the year***

During the year, the focus has been on following up on the target group survey, KTH International Student Survey, which was conducted in 2018. Measures have been taken to adapt the work in accordance with the results of the study. Examples include an initiative to further strengthen the programme descriptions, as prospective students demand clear and detailed information about the content of the programmes. In this year’s update round, all programmes received feedback based on the target group’s most frequently asked questions, which led to clarification of the programme descriptions.

KTH has also developed a broader range of webinars, as these have proven to be an important information channel that is also sustainable and cost-effective. During the year, KTH has offered some twenty webinars for prospective international students, focusing on topics such as educational

offerings, admissions, scholarships, practical preparations prior to arrival and student life. The webinars have attracted a large number of participants from all over the world and have been evaluated very favourably by the target group.

The KTH International Student Survey showed that career opportunities are crucial for the choice of university and education, which is why an initiative has been conducted involving interviews with alumni, with the aim of illustrating what relatively recent alumni are working on. The project resulted in around 100 interviews with alumni from just about all Master’s programmes.

KTH’s steering documents determine that sustainable development must permeate all study programmes, and an initiative has been conducted to highlight this issue to prospective international students. As a result, information has been included in all Master’s programme descriptions regarding how the programmes relate to the global sustainable development goals. The issue has also been raised in webinars focusing on the Master’s programmes. During special theme weeks, existing students have provided examples of sustainability work at their Schools via social media. In addition, KTH’s state-funded scholarship programme, KTH Scholarship, has focused on sustainability, with all applicants having to describe how they will use their education at KTH to contribute to sustainable development.

In order to reach out to new student groups, KTH has started using digital keyword advertising aimed at prospective international students. This initiative is continually being evaluated and adapted in order to reach the right target audience.

Case management regarding e-mails from e.g. prospective students has been coordinated and developed during the year. The target group is offered a common entrance for questions concerning studies at KTH, and response times and service have been quality assured to a greater extent.

Tailored activity plans have been developed for KTH’s five Schools during the year, focusing on the recruitment of international students. The plans must clarify which initiatives should be prioritised at the Schools and facilitate joint initiatives.

#### ***Activities to create better visibility and to recruit applicants***

In 2019, KTH has participated in a number of education fairs and university visits focusing on student recruitment in India, China, Indonesia, Thailand, Singapore, the Philippines, South Korea, Colombia, Mexico and Turkey. KTH collects contact information at the fairs from potential students for further communication and evaluation.

In China, KTH works primarily within the framework of the cooperation agreements that have been entered into with around ten selected universities. Regional coordinators visit the universities on a couple of occasions every year to present KTH and meet with applicants. The cooperation agreements mean that, in certain cases, students can be admitted to a

Swedish second-cycle study programme after three years of study in a normal four-year bachelor's degree programme in China. Such an agreement also exists with one university in India.

KTH attaches special importance to engaging and educating foreign programme students as international student ambassadors. They have the task of responding to questions from prospective students, representing KTH within the framework of various types of digital communication, and acting as hosts during visits to the campus. During the year, more student ambassadors were recruited than previously, which has led to some 50 programmes leading to Master's degrees now having an international student ambassador. In addition to this, a number of international students share their experiences and perceptions through blogs.

Digital communications in social media have been continually developed, both in terms of content as well as choice of channels. Particular focus has been placed on Chinese channels in order to overcome communication barriers in the country, with a presence in Chinese social media such as Weibo, WeChat and Qq.

KTH cooperates with agents in Turkey, Vietnam, Thailand and Indonesia. KTH has chosen to use recruitment agents in a few countries where the students are used to turning to an agent, as a complement to other efforts in these areas. All agents work on a commission basis, with remuneration only for those fee-paying students they successfully recruit. Eleven (twelve) of the registered new students in 2019 were recruited via these agents.

During the year, work was developed on financing opportunities for tuition-paying students, for example by initiating and deepening the working relationship with foreign scholarships organisations and other funders. Cooperation agreements exist with organisations in Indonesia, Colombia, Chile and Mexico, which generate a number of scholarships annually. KTH has also developed a programme for company-financed scholarships, the KTH Global Talent Programme, which will provide an attractive way for companies to contribute with funding of students' education, and at the same time establish contacts with future members of the workforce.

#### ***Communication with applicants and accepted students***

The recruitment work continues until the students commence their academic studies, and it is therefore considered to be a priority to provide information and support to the accepted students right up to registration. The purpose of the activities is to strengthen the accepted students in their choice of KTH and to answer questions of an academic and practical nature prior to their travel to Sweden and commencement of studies.

During the year, digital newsletters were sent out to the international students throughout the process, and webinars were offered for practical preparations. With the assistance

of the international student ambassadors, KTH also telephoned all accepted students in connection with the admissions acceptance notifications being sent out. Furthermore, KTH arranged preparatory seminars in countries where there were a large number of admitted students. In most cases, these seminars were conducted in collaboration with other Swedish institutions of higher education or diplomatic missions abroad, and were combined with other activities in the region, such as university visits or meetings with scholarship organisations. A total of around 400 admitted students participated in preparatory seminars around the world.

#### **Demand for an education at KTH**

The demand for an education at KTH leading to a vocational degree remains very substantial, and has increased slightly compared to the previous year. The number of first-choice applicants for these programmes totalled 5,706 (5,595) in 2019. The number of student slots planned amounted to 2,258 (2,185).

The most sought after courses were, as before, the programme leading a Master's Degree in Architecture with 836 (938) first-choice applicants, as well as the programmes leading to the Degree of Master of Science in Engineering with a major in Computer Science and Technology with 714 (665), Industrial Economics with 675 (670) and Engineering Physics with 447 (432) first-choice applicants. Constructional Engineering and Design saw the most first-choice applicants in the programmes leading to the Degree of Bachelor of Science in Engineering, with 264 (257).

KTH has an English-language first-cycle study programme, the Bachelor's degree programme in Information and Communication Technology. In 2019, the programme had 926 first-choice applicants, of whom 277 were in the national admissions round and 649 in the admissions round for courses given in English. This shows a great interest in courses given in English even at the undergraduate level (first-cycle courses and study programmes).

The number of applications for master's programmes (60 and 120 credits) is substantial this year as well. Of 14,388 (16,208) web registrations to the courses given in English in a second-cycle study programme starting in the autumn term 2019, 11,044 (12,560) were liable to pay tuition fees, of whom 4,215 (5,948) paid the registration fee.

KTH coordinates admission to the Master's programme with eight different tracks given by EIT Digital within the framework of the European Institute of Innovation and Technology (EIT). Some of the admitted students commence their studies at a university other than KTH, and some do not study at KTH at all but rather only at the partner university. A total of 1,873 (1,831) applications for the programme were received.

The qualifying access programmes, Technical Preparatory Year and Technical Preparatory Term, had a total of 1,504 (1,742) first-choice applicants in 2019. The program-

mes start in both the spring term and the autumn term. The Technical Preparatory Year is a one-year qualifying education that is intended for students who have not met the full admission requirements for KTH's educational programmes during their upper secondary school studies. The Technical Preparatory Year provides supplementary education at the upper secondary level in mathematics, physics and chemistry. It is also possible to apply only for the second term of the Technical Preparatory Year, which is particularly suitable for those who have attended the upper secondary school's technology programme. Approved results in the qualifying Technical Preparatory Year or Technical Preparatory Term guarantees a place on one of KTH's programmes leading to a Master of Science in Engineering, a Bachelor of Science in Engineering or a Master of Science in Secondary Education.

Admissions to KTH's educational programmes take place in nationally coordinated admissions rounds in the NYA admissions system, which is administered by the Swedish Council for Higher Education (UHR). The admission to EIT Digital takes place in EIT's own admissions portal.

### Alternative selection

For autumn 2019 admissions, KTH used the mathematics and physics entrance exam as an alternative method of selection to the programmes leading to the Degree of Master of Science in Engineering with a major in Engineering Physics, Electrical Engineering and Vehicle Engineering. The mathematics and physics entrance exam is designed and administered by Chalmers University of Technology, and has been used as a selection model for admission to the programmes leading to a master's degree at KTH since 2011. Up to a maximum of one-third of the student slots for these programmes can be given to applicants who have passed the mathematics and physics entrance exam. A minimum result must be achieved on the test in order to gain admittance. For the 2019 autumn term, 45 applicants for engineering physics, 13 for electrical engineering and six for vehicle engineering studies were admitted.

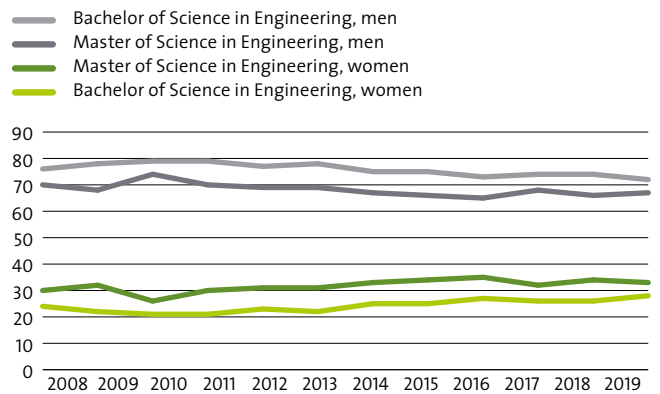
For autumn 2019 admissions, KTH has used the architectural entrance exam as a selection group for up to one-third of the student slots for the programme leading a Master's Degree in Architecture. The outcome for the autumn term 2019 admissions was 59 admitted in the architectural entrance exam group in selection 1; the total number of admissions in selection 1 was 181.

### Assessment and recognition of prior learning

KTH has continued its work on the internal process for validation. The focus group for validation has met regularly to discuss how the process and cooperation within KTH can be improved. The work has continued aimed at informing applicants and prospective applicants, through KTH's website, about the possibility of having their prior learning

Figure 1

Gender structure – new female and male students 2008-2019 in percent



Source: Ladok

assessed. A large number of authorities and other potential stakeholders have received information about the potential for validation at KTH. KTH is conducting an ongoing collaboration with the business community, including Scania, regarding validation. Several internal training courses on validation have been held. The academic studies counsellors participate in the Validation course in practice. During the year, KTH has also participated in conferences and seminars aimed at increasing expertise regarding the validation of prior learning.

During the year, KTH has completed the project "Validation and Recognition in the Bachelor and Master of Science in Engineering Programmes", which was a collaboration with Chalmers University of Technology, Linköping University and the University of Borås on behalf of UHR. The project has resulted in a proposed organisation for validation in engineering programmes both locally as well as for national collaborations. The process and method support for validation of specialist knowledge in engineering degree programmes that has been produced has been further developed during the year. Even though the project has now been completed, the universities involved intend to continue the collaboration with regular meetings.

KTH has been involved in a new international project regarding validation, "Recognition of prior learning in practice" (RPL), with UHR as the coordinator in Sweden. The project includes universities from Sweden, Iceland, Ireland, Austria and Croatia. The aim is to learn from each other's experiences and to develop a tried and tested manual for structured and quality assured work on validation, adapted to the needs and practices of each country. Meetings have been held in Stockholm and Vienna during the year.

### Beginners

In 2019, a total of 2,418 (2,651) beginners commenced their first year of studies on KTH's educational programme leading to a vocational degree, of whom 117 (119) were on the pro-

Figure 2

## Total number of new students 2016–2019

	2019		2018		2017		2016	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
<b>Master of Architecture, Degree Programme 300 HE credits</b>	<b>117</b>	<b>58/42</b>	<b>119</b>	<b>58/42</b>	<b>107</b>	<b>57/43</b>	<b>104</b>	<b>60/40</b>
<b>Master of Science in Engineering Degree Programme 300 HE credits</b>								
Biotechnology	76	58/42	82	61/39	68	68/32	72	60/40
Engineering and Education	53	45/55	56	50/50	60	43/57	57	44/56
Computer Science and Engineering	175	18/82	191	17/83	166	20/80	187	21/79
Design and Product Realisation	107	46/54	115	47/53	113	48/52	117	51/49
Electrical Engineering	92	20/80	97	20/80	83	18/82	77	14/86
Energy and Environment	77	61/39	86	62/38	82	49/51	84	52/48
Vehicle Engineering	94	15/85	113	16/84	92	13/87	112	21/79
Industrial Engineering and Management	153	24/76	159	36/64	151	25/75	160	36/64
Industrial Technology and Sustainability	34	38/62	33	39/61	-	-	-	-
Information and Communication Technology	66	17/83	73	21/79	74	22/78	80	26/74
Mechanical Engineering	138	17/83	159	18/82	190	19/81	201	27/73
Materials Design and Engineering	41	49/51	47	40/60	45	38/62	48	33/67
Medical Engineering	51	59/41	56	41/59	55	44/56	56	55/45
Media Technology	69	52/48	79	42/58	69	49/51	69	54/46
Civil Engineering and Urban Management	163	45/55	180	48/52	164	41/59	178	44/56
Engineering Physics	128	28/72	150	19/81	120	18/82	134	16/84
Engineering Chemistry	61	48/52	68	54/46	69	64/36	69	55/45
Open entrance	114	25/75	133	29/71	129	28/72	144	33/67
<b>Sub-total</b>	<b>1,692</b>	<b>33/67</b>	<b>1,877</b>	<b>34/66</b>	<b>1,730</b>	<b>32/68</b>	<b>1,845</b>	<b>35/65</b>
<b>Bachelor of Science in Engineering, Degree programme 180 HE credits</b>								
Constructional Engineering and Design	170	34/66	185	33/67	153	35/65	178	35/65
Computer Engineering	146	23/77	157	15/85	136	18/82	138	15/85
Electronics and Computer Engineering	33	9/91	33	15/85	33	9/91	41	12/88
Electrical Engineering	37	14/86	40	10/90	43	7/93	44	7/93
Industrial Technology and Production Maintenance	23	13/87	32	22/78	26	23/77	-	-
Chemical Engineering	46	43/57	45	51/49	58	52/48	53	49/51
Mechanical Engineering	80	28/72	83	11/89	95	16/84	113	19/81
Medical Engineering	24	29/71	30	47/53	39	38/62	41	39/61
Engineering and Economics	50	32/68	50	46/54	53	28/72	49	43/57
<b>Sub-total</b>	<b>609</b>	<b>28/72</b>	<b>655</b>	<b>26/74</b>	<b>636</b>	<b>26/74</b>	<b>657</b>	<b>27/73</b>
<b>Subject Teacher Education in Technology, Secondary Education 270 HE credits</b>	<b>6</b>	<b>50/50</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Bridging Teacher Education 90 HE credits</b>	<b>29</b>	<b>55/45</b>	<b>57</b>	<b>37/63</b>	<b>44</b>	<b>39/61</b>	<b>41</b>	<b>29/71</b>
<b>Bridging Teacher Education for Graduates with a third cycle degree 90 HE credits</b>	<b>15</b>	<b>55/45</b>	<b>13</b>	<b>31/69</b>	<b>23</b>	<b>57/43</b>	<b>-</b>	<b>-</b>
<b>Bridging programme for architects with foreign qualifications</b>	<b>3</b>	<b>67/33</b>	<b>26</b>	<b>69/31</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Bridging programme for engineers with foreign qualifications</b>	<b>6</b>	<b>100/0</b>	<b>19</b>	<b>53/47</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Masters programmes</b>								
Masters programmes 120 HE credits	2,392	35/65	2,472	33/67	2,338	34/66	2,320	32/68
<i>of which within Master of Science in Engineering programmes.</i>	1,207	35/65	1,304	34/66	1,133	35/65	1,164	32/68
Masters programmes 60 HE credits	73	49/51	85	65/35	131	66/34	138	49/51
<b>Sub-total</b>	<b>2,465</b>	<b>35/65</b>	<b>2,557</b>	<b>34/66</b>	<b>2,469</b>	<b>36/64</b>	<b>2,458</b>	<b>33/67</b>
<b>Bachelors programmes 180 HE credits</b>	<b>123</b>	<b>37/63</b>	<b>117</b>	<b>37/63</b>	<b>130</b>	<b>29/71</b>	<b>114</b>	<b>35/65</b>
<b>University Diploma programmes 120 HE credits</b>	<b>36</b>	<b>31/69</b>	<b>45</b>	<b>33/67</b>	<b>42</b>	<b>31/69</b>	<b>43</b>	<b>28/72</b>
<b>Technical Preparatory Year, Technical Preparatory Semester 60/30 HE credits</b>	<b>720</b>	<b>30/70</b>	<b>738</b>	<b>33/67</b>	<b>717</b>	<b>38/62</b>	<b>737</b>	<b>36/64</b>
<b>Total</b>	<b>5,821</b>	<b>34/66</b>	<b>6,223</b>	<b>34/66</b>	<b>5,897</b>	<b>34/66</b>	<b>5,999</b>	<b>34/66</b>

Source: Ladok

gramme leading to a Master's Degree in Architecture, 1,692 (1,877) on the programmes leading to a Degree of Master of Science in Engineering, and 609 (655) in the programmes leading to the Degree of Bachelor of Science in Engineering. See *figure 2* for further details. At the same time, the final two years of a Master of Science in Engineering degree programme constitutes a master's degree programme, which means that these five-year programme students are registered as beginners on a master's degree programme when they begin the fourth year.

The number of beginners in the master's programmes was 2,392 (2,472). Of these, 1,185 (1,168) were students on KTH's master's programmes, while 1,207 (1,304) were previously also students in a programme leading to the Degree of Master of Science in Engineering. The master's programmes (60 credits) had 73 (85) beginners.

Of the total number of beginners in 2019, 34 percent were women and 66 percent men. In the Development Plan for 2018–2023, KTH highlights the fact that several educational programmes presently have a low proportion of women. The operational plan for 2019 includes initiatives for a long-term endeavour to achieve a better balance between women and men in KTH's educational programmes. Of the beginners in the programmes leading to the Degree of Master of Science in Engineering, 33 (34) percent were women and 67 (66) percent were men in the autumn term 2019. Of the beginners in the programmes leading to the Degree of Bachelor of Science in Engineering in 2019, 28 (26) percent were women and 72 (74) percent were men. However, the distribution between men and women differs sharply between the various programmes at KTH. See *figure 2* for the gender distribution within programme types and programmes, as well as *figure 1* for the course of development over the past twelve years.

The average age for beginners in the programme leading to a Degree of Master of Architecture was 24 years old for both women and men. In the programmes leading to a Degree of Master of Science in Engineering in 2019, the average age was 21 for women and 20 for men. For beginners in the programmes leading to the Degree of Bachelor of Science in Engineering, the average age was 22 years old for both women and men. The average age for both women and men in master's programmes (60 and 120 credits) was 24 years old. For qualifying access programmes, the average age was 21 years old for both genders. The average ages have remained stable over time.

In addition to the admission of beginners in year 1, it is possible to begin in a later part of an educational programme. 134 (147) new students commenced the latter parts of a programme leading to the Degree of Master of Science in Engineering, and 203 (158) began the latter parts of a master's programme (60 or 120 credits).

In the autumn term 2019, 653 (672) new tuition-paying students were registered at KTH, of whom 200 (202) were

women and 453 (470) were men, which means that KTH remains at a stable level.

Of the paying students, 64 (65) had been awarded scholarships from Swedish organisations or through scholarship programmes where KTH has scholarship funding agreements: 35 (41) UHR scholarships, 1 (2) funded by ABB, 2 (2) KTH India Scholarship Foundation, 2 (1) Colfuturo, 2 (6) LPDP and 22 (19) via the Swedish Institute (SI).

Of the remaining 589 (607) tuition-paying students, 93 (90) came via EIT Digital and 73 (95) came via EIT InnoEnergy.

In 2019, 693 (658) externally recruited programme beginners from the EU/EEA/Switzerland, including Sweden, commenced their studies in a second-cycle study programme, of whom 260 (250) were women and 433 (408) were men.

In 2019, 720 (738) students started on the Technical Preparatory programme. Of these beginners, 30 (33) percent were women and 70 (67) percent were men. Of those who started on the Technical Preparatory programme in the autumn term of 2018 or spring term of 2019, 38 (37) percent, or a total of 274 (271) students (35 percent women and 65 percent men), continued on a programme leading to the Degree of Bachelor or Master of Science in Engineering at KTH in 2019. The majority of those who continue their studies at KTH do so in a programme leading to the Degree of Master of Science in Engineering.

### Courses between upper secondary school and higher education for preparation for higher education studies

Online-based courses for the preparation for higher education studies have also been offered to students who intend to enter degree programmes in the fields of technical studies and science in 2019. The courses are intended support beginners and to facilitate the transition from upper secondary school to studies in an institution of higher education. KTH works together with several other institutions of higher education in the courses for preparation for higher education studies in mathematics. As a result of the development of technology in the form of digitalisation, a major project was launched in 2018 to deliver the preparatory courses in a format similar to the concept of Massive Open Online Courses (MOOC courses). This work continued in 2019. The switchover to open courses means that the students are no longer registered in Ladok. New tools for monitoring student participation in these courses ought to be developed.

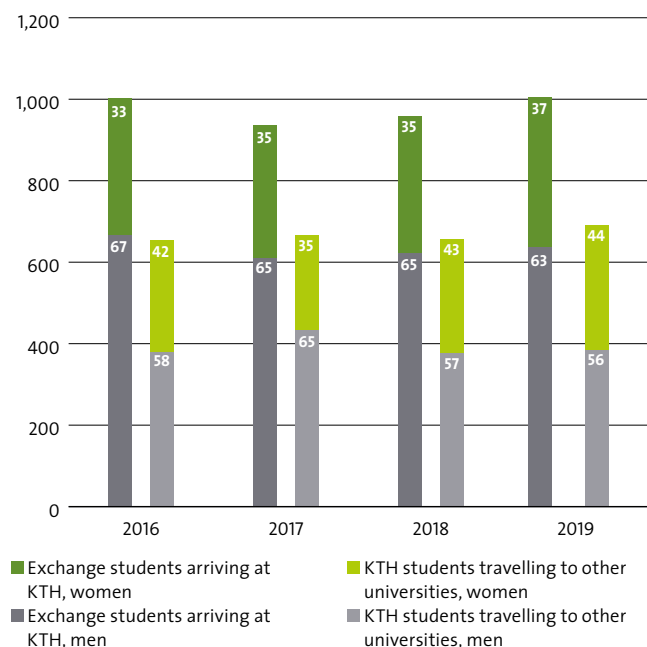
### International mobility

KTH works actively to ensure that, to a greater extent, the students conduct part of their education abroad. The target according to KTH's Development Plan is that a large proportion of the students should study at least one term abroad within the framework of their education. In 2019, a total of 690 (656) students commenced studies abroad, which means that KTH remains at a stable level (see *figure 3*). The most common countries for study abroad were the United States,

Figure 3

**Student exchange 2016–2019**

Number of students who began student exchange per year, in absolute numbers and proportion of women and men in percent



Source: Ladok

Singapore, France, China including Hong Kong and Australia (see figure 4). Of the students travelling to study abroad, 55 (51) percent studied at a university outside the EU/EEA/Switzerland.

For the eighth year in a row, KTH has organised KTH Global to highlight the international opportunities that are offered during the study period. Over the course of three days, the students attended a talk show about studying abroad, information meetings at KTH’s Schools, and an education fair at which more than 50 of KTH’s partner university were represented.

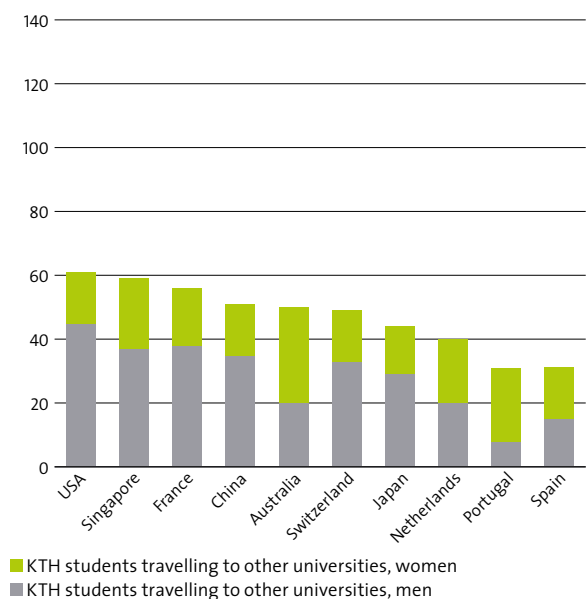
The interest in studying as an exchange student at KTH is still great. During the year, 1,006 (958) foreign exchange students commenced studies at KTH. Within Europe, most students came from universities in Germany, France, Switzerland and Spain (see figure 4). Of the total number of incoming exchange students, 39 (39) percent came from countries outside the EU/EEA/Switzerland, with the majority coming from Singapore, China including Hong Kong, the USA and Australia.

In addition to the exchange students, KTH has a relatively large group of incoming double-degree students within special cooperation agreements with universities in Europe and Japan. These students primarily study on a second-cycle study programme for one and a half to two years, and then receive a Degree of Master of Science in Engineering from KTH and an equivalent degree from their home university. The number of double-degree students who commenced studies at KTH during the year amounted to 128 (142). In 2019,

Figure 4

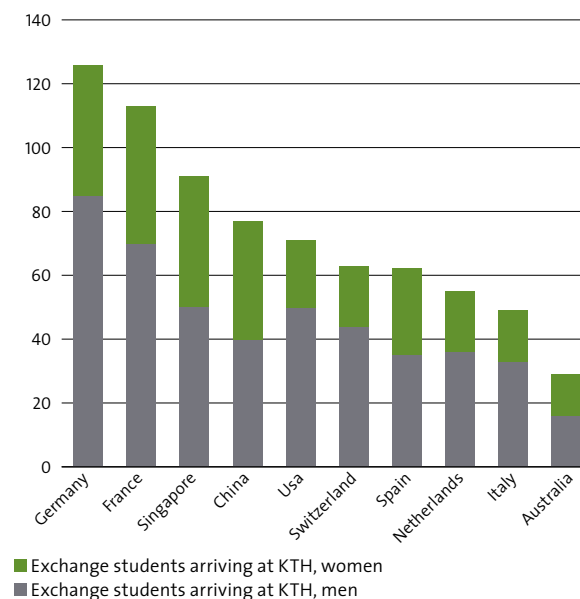
**Student exchange – most popular countries 2019**

Number of students who began student exchange during the year: the most popular countries KTH students travel to



Source: Ladok

Number of students who began student exchange during the year: the most popular countries exchange students originate from



Source: Ladok



one (0) KTH student began double-degree studies abroad.

There are also opportunities for various types of international experience other than pure exchange studies. During the year, 70 (63) KTH students commenced Erasmus internships at companies or organisations in Europe. Many of those who travel are international master's students. The most popular countries are Germany, France, the UK and the Netherlands.

Interest in the SIDA-funded scholarship programme Minor Field Studies (MFS) remains high at KTH. During 2019, KTH was awarded 53 (70) MFS scholarships by the Swedish Council for Higher Education (UHR). There were 91 (70) applications, of which 53 (65) were granted. The most common countries for KTH's MFS scholarships were Mozambique, Cuba and Kenya.

KTH SAAB is a new collaboration initiated by SAAB, which involves internships at SAAB Järfälla in Stockholm and SAAB Australia in Adelaide. The collaboration is linked to a student exchange between KTH and the University of South Australia in Adelaide. One KTH student and three Australian students have taken part in the exchange so far.

### E-learning

KTH has the goal of becoming a leader in e-learning, both in Vision 2027 and in the Development Plan for 2018–2023. During 2019, the management of Canvas and other e-learning systems has continued to develop. For example, the potential for the educational use of digital tools has been further developed and support for administrative regulations has been reinforced in respect of areas such as archiving. The goal is to develop and manage a leading digital learning environment and to encourage KTH's teachers to use it. The process of change has continued systematically in 2019, with the needs of the operation as a starting point and in relation to the research in digital learning that is conducted at KTH. The single largest activity has been to demand and develop a solution in order to transfer results from Canvas to Ladok. Several parallel educational initiatives from 2018 have been managed and further developed in 2019, such as teachers being able to receive educational and technical support via web resources, individual supervision including for the design of classrooms in Canvas, as well as how to produce their own educational video materials. The Lunch 'n' learn seminar series has been arranged roughly once a month during term time, and allows teachers to participate in seminars concerning course development in digital environments during their lunchbreak. For those who cannot attend in person, it is possible to participate via live video or by watching the video recording online afterwards.

A project about course information commenced in the autumn of 2018 and has continued in 2019. A key principle is that all information about courses is gathered in one place in KTH's system.

In order to achieve the objective of becoming a leader in e-learning, KTH has intensified its investments in digital

examinations during the year. A large number of courses have tested solutions for this during autumn 2019. During 2020, these solutions will switch to administration, while digital examinations will be tested in more types of courses through various pilot projects.

### Integration initiatives

Since 2011, the course to teach Swedish to engineers in Stockholm County, "Sfinx - Intensive Swedish for Engineers", has been a coordinated educational programme that is an integral part of KTH's regular activities. The purpose is to facilitate entry into the labour market for graduate engineers who have immigrated to Sweden. Sfinx is a collaboration between KTH, Järfälla Municipality, City of Stockholm, the County Administrative Board in Stockholm County and the Swedish Association of Graduate Engineers (Sveriges Ingenjörer). For 18 months, the engineers can study Swedish, from the level Swedish for immigrants up to upper secondary level, as well as English. They participate in the programme at KTH without being registered in courses, and they have the opportunity to participate in a mentorship programme for which the Swedish Association of Graduate Engineers is responsible. They also receive information about Swedish industry and the Swedish labour market. The programme has more than 100 participants every year, and in total it has been attended by almost 1,100 participants. The reporting has been accomplished in the form of reports that are integrated into the Swedish teaching and have contributed to a grade in Swedish. One trend that has continued since 2016 is that the business community contacts Sfinx to recruit individuals holding the relevant skills.

Since 2017, KTH has been conducting a Marianne and Marcus Wallenberg-funded project "Software Development Academy," where new arrivals are quickly trained in software development with innovative pedagogical methods and with far-reaching cooperation with the business community. In 2018, the project was granted additional support from the EU/ESF in the amount of SEK 16 million. In 2019, the project has been expanded and implemented with Lund University as a partner. 98 participants started in 2019 and a total of 211 participants from 52 countries have completed the programme. In addition to grants to the educational programme itself, the EU/ESF finances some research and development in order to be better able to understand the mechanisms regarding success factors, the capability of higher education to develop skills and to disseminate knowledge about the project in the academic world. The project will run until 2022.

### *Bridging programme for architects and engineers with foreign qualifications*

Within the framework of the commission, KTH has planned and established supplementary courses for both architects and engineers.

The programme encompasses 120 higher education credits and includes general vocational preparatory courses in subjects such as law, social studies, communication, sustainable development, entrepreneurship and leadership, as well as subject-specific advanced specialised courses or broadening courses. For the subject-specific courses, a study plan is drawn up that is designed with respect to existing skills, personal interests, the specific skills needs of the labour market in the professional or work area and an interview with the student. The aim is that the individual who has completed an education abroad as an architect or an engineer is to receive the supplementary knowledge that is needed to be able to practice their profession in Sweden. The educational programme does not lead to an academic degree.

KTH has accepted students for the two variants of this programme in both the spring and autumn terms in 2018 and 2019. In 2018, a total of 26 architects/architecture students and 19 technical engineers/engineering students started the courses, collectively generating the equivalent of 22 full-time student equivalents. Three architects and six engineers started the courses in 2019, generating five full-time student equivalents. In total in 2019, the courses have encompassed 25 full-time student equivalents.

### Performance

The number of full-time student equivalents and annual performance equivalents in first-cycle and second-cycle study programmes in 2019 amounted to a total of 12,442 (12,612) and 10,460 (10,449) respectively. Some of the examinations for the autumn term are always scheduled for late in December. For the outcome in 2019, this means that 478

annual performance equivalents registered in 2019 belong to the examinations that took place in December 2018.

Of the total number of full-time student equivalents, 93 percent were linked to the fields of technological and natural sciences. In 2019, KTH had the opportunity to offset a maximum of 125 full-time student equivalents and annual performance equivalents against the design educational area. However, the design area encompasses 363 full-time student equivalents and 316 annual performance equivalents for 2019. The full-time student equivalents and annual performance equivalents in excess of 125 are offset against the technology educational area.

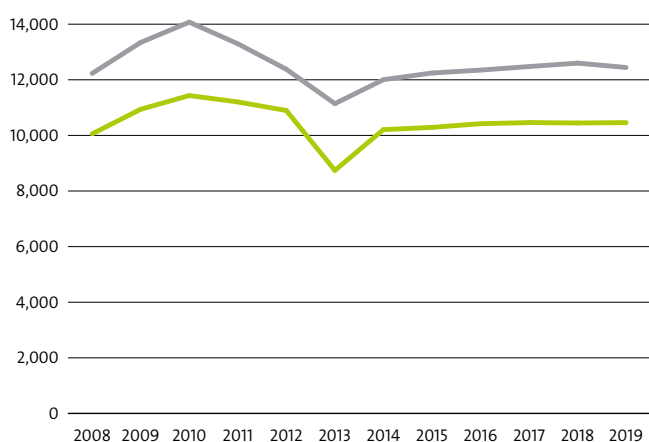
The degree of performance for first-cycle and second-cycle study programmes was 84 (83) percent, calculated as the number of annual performance equivalents in relation to the number of full-time student equivalents. The degree of performance is stable over time.

The proportion of women of full-time student equivalents was 34 percent and the proportion of men was 66 percent, which is at the same level as in recent years. In the programme leading to the Degree of Master of Science in Engineering, the proportion of women was 34 percent and the proportion of men was 66 percent, while the programme leading a Master's Degree in Architecture had a reversed distribution with 58 percent women and 42 percent men. In the programme leading to a Degree of Bachelor of Science in Engineering, the proportion of women was 28 percent and the proportion of men 72 percent. The master's degree programmes had 34 percent women and 66 percent men. See figure 7.

In addition to the deductions paid for grants, the tui-

Figure 5

Full year students and full year performances 2008–2019

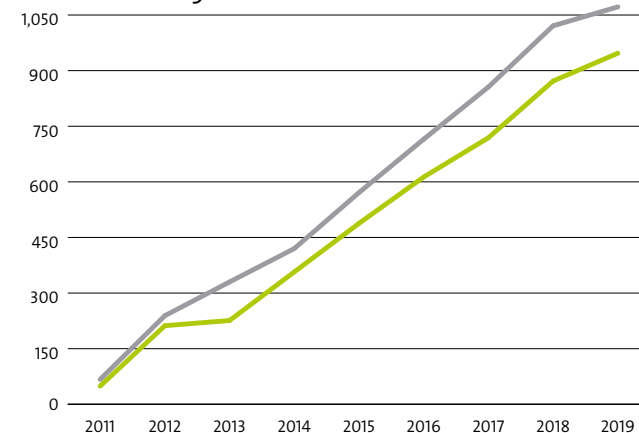


— Full year students (FYS) are defined as the number of students who have started studies on a course multiplied by the number of course higher education credits divided by 60.  
 — Full year performance (FYP) is defined as the number of higher education credits gained on a course or sub-course divided by 60.

Source: Ladok

Figure 6

Full year students and full year performances, fee-paying students 2011-2019



— Full year students (FYS) are defined as the number of students who have started studies on a course multiplied by the number of course higher education credits divided by 60.  
 — Full year performance (FYP) is defined as the number of higher education credits gained on a course or sub-course divided by 60.

Source: Ladok

tion-paying students have generated 1,072 (1,021) full-time student equivalents and 947 (872) annual performance equivalents during 2019 (see figures 6 and 8).

In total, KTH had 1,676 (1,564) tuition-paying programme students in 2019, of whom 509 were women and 1,167 were men. Of these, 198 (221) were scholarships funded by Swedish or KTH-affiliated scholarship programmes, which corresponds to about 12 percent of the total number of tuition-paying students. In addition, there were 11 tuition-paying students, of whom three were women and eight were men, on freestanding courses. This means that the largest proportion of tuition-paying students are either paying themselves or financed by means of scholarship programmes which KTH does not have information about.

## Degrees

Over the course of 2019, a total of 1,150 (1,134) Degrees of Master of Science in Engineering (civilingenjörsexamina), 114 (84) Degrees of Master of Architecture (arkitektexamina), 1,243 (737) other Master of Science degrees (masterexamina) for students who did not also receive a Degree of Master of Science in Engineering (civilingenjörsexamen) at KTH and 267 (273) Degrees of Bachelor of Science in Engineering (högskoleingenjörsexamina) were awarded. In total, KTH awarded 1,904 (1,287) Degrees of Master of Science (120 credits) (teknologie masterexamina) during the year. Of these, 661 (549) have also received a Degree of Master of Science in Engineering in 2019 or earlier. A Degree of Master of Science (60 credits) (teknologie magisterexamen) was

Figure 7

### Full year students 2016–2019

	2019		2018		2017		2016	
	FYS	Proportion (%) of women/men	FYS	Proportion (%) of women/men	FYS	Proportion (%) of women/men	FYS	Proportion (%) of women/men
Master of Architecture, 270/300 HE credits	446	58/42	455	58/42	449	61/39	454	60/40
Master of Science in Engineering 270/300 HE credits	5,371	34/66	5,415	33/67	5,451	33/67	5,443	32/68
<i>in addition, within Master programmes</i>	1,995	34/66	2,120	33/67	2,053	33/67	1,938	33/67
Bachelor of Science in Engineering 180 HE credits	1,511	28/72	1,491	27/73	1,489	26/74	1,495	26/74
Bridging Teacher Education 90 HE credits	52	49/51	50	38/62	66	39/61	25	30/70
Subject Teacher Education in Technology, Secondary Education, 270 HE credits	2	53/47	1	100/0	3	100/0	3	100/0
Masters Programmes 60/90 HE credits	63	55/45	88	63/37	106	55/45	117	51/49
Masters Programmes 120 HE credits	3,295	34/66	3,372	34/66	3,297	33/67	3,081	34/66
<i>of which within Master of Science Engineering programmes</i>	1,995	34/66	2,120	33/67	2,053	33/67	1,938	33/67
Bachelors Programmes 180 HE credits	261	34/66	259	35/65	255	37/63	270	39/61
Technical Preparatory Year, Technical Preparatory Semester 60/30 HE credits	605	32/68	613	35/65	577	38/62	619	36/64
University Diploma 120 HE credits	59	30/70	71	28/72	68	21/79	71	25/75
Exchange students arriving at KTH	634	37/63	606	35/65	574	34/66	609	32/68
Courses	143	39/61	189	39/61	142	42/58	161	43/57
<b>Total</b>	<b>12,442</b>	<b>34/66</b>	<b>12,612</b>	<b>34/66</b>	<b>12,476</b>	<b>34/66</b>	<b>12,349</b>	<b>34/66</b>

Source: Ladok

Figure 8

### Full year students and performance rate, fee-paying students 2016–2019

	2019		2018		2017		2016	
	HST	Performance rate (%)	HST	Performance rate (%)	HST	Performance rate (%)	HST	Performance rate (%)
Master of Science in Engineering 300 HE credits	2	36	1	79	1	58	0	40
Bachelor of Science in Engineering 180 HE credits	3	85	2	97	1	110	1	80
Bachelors Programmes 180 HE credits	12	88	10	90	7	76	3	52
Masters Programmes 60 HE credits	18	87	20	87	19	108	18	81
Masters Programmes 120 HE credits	1,032	88	978	85	818	84	673	86
Courses	0	119	2	59	1	58	1	-
Science without Borders	0	137	0	0	0	0	19	83
Study Abroad Programmes	4	96	8	124	9	61	-	-
Nordig	1	214	1	55	-	-	-	-
<b>Total</b>	<b>1,072</b>	<b>88</b>	<b>1,021</b>	<b>85</b>	<b>856</b>	<b>85</b>	<b>715</b>	<b>86</b>

Source: Ladok

Figure 9

## First degrees 2016–2019

	2019		2018		2017		2016	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
<b>Degree of Master of Architecture 270/300 HE credits</b>	<b>114</b>	<b>57/43</b>	<b>84</b>	<b>60/40</b>	<b>88</b>	<b>58/42</b>	<b>42</b>	<b>62/38</b>
<b>Degree of Master of Science in Engineering 270/300 HE credits</b>	<b>1,150</b>	<b>35/65</b>	<b>1,134</b>	<b>34/66</b>	<b>1,161</b>	<b>34/66</b>	<b>913</b>	<b>36/64</b>
Degree of Master of Science in Engineering 270/300 HE credits	39	64/36	49	59/41	48	73/27	32	66/34
Biotechnology	35	54/46	34	38/62	24	50/50	22	23/77
Engineering and Education	87	14/86	83	18/82	97	10/90	65	6/94
Computer Science and Engineering	91	53/47	66	55/45	108	56/44	62	48/52
Design and Product Realisation	63	13/87	42	5/95	46	7/93	50	20/80
Electrical Engineering	56	57/43	59	53/47	64	58/42	31	68/32
Energy and Environment	100	15/85	115	14/86	98	16/84	80	19/81
Vehicle Engineering	140	37/63	123	42/58	101	45/55	106	44/56
Industrial Engineering and Management	34	18/82	32	19/81	48	13/87	15	27/73
Information and Communication Technology	30	57/43	35	69/31	46	39/61	42	50/50
Engineering Chemistry/Chemistry and Chemical Engineering/Chemical Science and Engineering	0	0/0	0	0/0	1	0/100	9	44/56
Surveying	123	25/75	122	18/82	101	19/81	109	23/77
Mechanical Engineering	25	36/64	32	38/62	25	28/72	21	43/57
Materials Design and Engineering	30	57/43	33	55/45	30	47/53	16	44/56
Medical Engineering	34	38/62	46	59/41	59	44/56	29	59/41
Media Technology	4	0/100	4	0/100	6	0/100	11	27/73
Microelectronics	142	53/47	138	41/59	137	47/53	119	51/49
Civil Engineering and Urban Management	98	18/82	105	14/86	111	18/82	85	27/73
Engineering Physics	0	0/0	0	0/0	1	0/100	3	0/100
Not within programme/specialisation	19	47/53	16	38/62	10	30/70	6	50/50
<b>Degree of Bachelor of Science in Engineering 180 HE credits</b>	<b>267</b>	<b>32/68</b>	<b>273</b>	<b>26/74</b>	<b>337</b>	<b>33/67</b>	<b>214</b>	<b>25/75</b>
<b>Degree of Master of Science</b>	<b>72</b>	<b>44/56</b>	<b>49</b>	<b>45/55</b>	<b>26</b>	<b>50/50</b>	<b>12</b>	<b>8/92</b>
in Secondary Education, 225 HE credits, 2 teaching subjects	4	0/100	8	75/25	2	50/50	0	0
in Upper Secondary Education, 210 HE credits, 1 teaching subject	5	40/60	3	33/67	6	50/50	0	0
in Upper Secondary Education, 300 HE credits, 2 teaching subjects	53	45/55	38	39/61	18	53/47	12	8/92
in Secondary Education, 270 HE credits	10	60/40	-	-	-	-	-	-
<b>Degree of Master of Science 120 HE credits</b>	<b>1,904</b>	<b>33/67</b>	<b>1,287</b>	<b>36/64</b>	<b>1,864</b>	<b>35/65</b>	<b>1,099</b>	<b>33/67</b>
of which also graduated as a Master of Science in Engineering <sup>1)</sup>	661	35/65	549	34/66	832	38/62	494	31/69
of which joint degree	31	48/52	23	30/70	21	24/76	15	20/80
<b>Degree of Master of Science 60 HE credits</b>	<b>106</b>	<b>61/39</b>	<b>102</b>	<b>63/37</b>	<b>136</b>	<b>50/50</b>	<b>70</b>	<b>43/57</b>
<b>Degree of Master of Science 240/270 HE credits<sup>2)</sup></b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>25/75</b>
<b>Master Degree 60/90 HE credits<sup>2)</sup></b>	<b>2</b>	<b>50/50</b>	<b>1</b>	<b>0/100</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0/100</b>
<b>Degree of Bachelor of Science 180 HE credits</b>	<b>934</b>	<b>37/63</b>	<b>700</b>	<b>37/63</b>	<b>1,112</b>	<b>39/61</b>	<b>739</b>	<b>40/60</b>
<b>University Diploma 120 HE credits</b>	<b>28</b>	<b>14/86</b>	<b>28</b>	<b>25/75</b>	<b>27</b>	<b>22/78</b>	<b>21</b>	<b>33/67</b>

1) this year and earlier

2) according to older regulations

Source: Ladok

awarded to 106 (102) students.

Of the 934 (700) Degrees of Bachelor of Science (teknologie kandidatexamen) awarded, 759 (578) have been received by students in the Master of Science in Engineering programme and 65 (37) by the students in the programme leading a Master's Degree in Architecture.

The trend of students earning more than one academic degree based on the same studies is continuing. In 2019, the proportion who earned one or more additional degrees combined with a Degree of Master of Science in Engineering was 55 (54) percent.

The proportion of women among those graduating with a Degree of Master of Science in Engineering amounted to 35 (34) percent and the proportion of men 65 (66) percent. For those graduating with a Degree of Master of Architecture, the proportion of women was 57 (60) percent and the proportion of men 43 (40) percent. See *figure 9* for the gender distribution within programme types and individual programmes.

KTH also awards master's degrees jointly with other universities. The number of degrees awarded jointly with other universities was 31 (23) in 2019.

In 2019, 19 (18) master's degrees (60 credits) and 528 (280) master's degrees (120 credits) were issued to students who paid tuition fees for their studies at KTH. These degrees are included in the data reported above.

### Career support

KTH's career activities are focused on providing support for students in their transition to a life in the workplace. Activities during 2019 have included individual career coaching for students as well as lunch seminars and workshops on career development in English and Swedish. Students were also offered drop-in counselling for career-related issues in KTH Entré. In all, approximately 1,000 students have participated in the various activities.

## Third-cycle education

### Recruitment

KTH conducts coordinated calls for applications to vacant doctoral slots. The purpose of coordinated calls for applications is to make KTH visible both as a workplace and as a university, and thereby increase the interest among prospective applicants. KTH has decided to extend the number of calls regarding vacant doctoral slots from five times a year to nine times a year, which evens out the range of vacancies over the year. The change was implemented as from 1 July 2019. This means that KTH conducted calls for applications to study slots at third-cycle level on seven occasions in 2019.

In 2019, calls for applications for a total of 316 (300) slots for doctoral students were made. In all, 18,030 individuals applied for these slots, of whom 4,405 were women, 13,555

were men and 70 did not state their gender. Recruitment to an educational programme leading to a doctorate also takes place after calls for applications in some other manner and without prior calls for applications.

### Admissions

In 2019, 333 (307) doctoral students were admitted. The proportion of women was 37 (32) percent and the proportion of men 63 (68) percent. Of the newly admitted doctoral students, 13 percent were admitted with the goal of graduating with a Licentiate degree. And of these, 44 percent were women and 56 percent were men.

Of this year's new admissions, 42 (43) doctoral students, of whom 48 percent are women and 52 percent are men, have their primary activities outside of the University and pursue doctoral studies within the framework of their employment (externally employed doctoral students). The employer may be either private or governmental.

Of those who were admitted to a programme at the doctoral level in 2019, 35 (29) percent, or 116 (89) individuals, have an academic degree from KTH. Among these, a master's degree is most common. Of the new admissions with an academic degree from KTH, 53 (46) percent have a master's degree and 43 (53) percent have a Degree of Master of Science in Engineering. Of the new admissions in 2019, 46 (51) percent have an academic degree from a country other than Sweden.

### Level of activity and financing of academic studies

Of the 1,841 doctoral students registered with some activity in third-cycle studies in 2019, 1,665 doctoral students have had a degree of activity of at least 50 percent and 1,826 have had a degree of activity of at least ten percent.

At year-end, 1,255, or 66 percent, of KTH's doctoral students had study financing in the form of doctoral positions on a full or part-time basis. Of those who had a doctoral position, 33 (30) percent were women and 67 (70) percent were men.

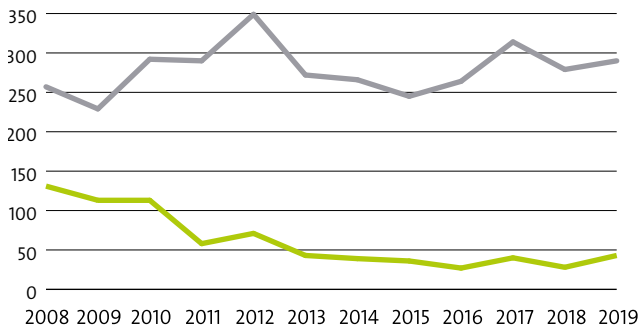
Of the students in a third-cycle study programme, 15 percent financed themselves by means of paid work connected with the educational programme (externally employed doctoral students), 4 percent by means of other employment at the University, and 11 percent by means of full-time or part-time scholarships. 5 percent, on a full or part-time basis, finance their studies in some other way. Many of the doctoral students who have their studies funded via scholarships receive these via KTH's joint collaboration with the China Scholarship Council.

### KTH's doctoral programmes

The doctoral programmes were established in 2011 and there are currently 32 such programmes. In order to establish a doctoral programme, a number of quality requirements are set with regard to purpose, target group and content, as well as and other related considerations. All new doctoral students are

Figure 10

Newly admitted research students 2008–2019

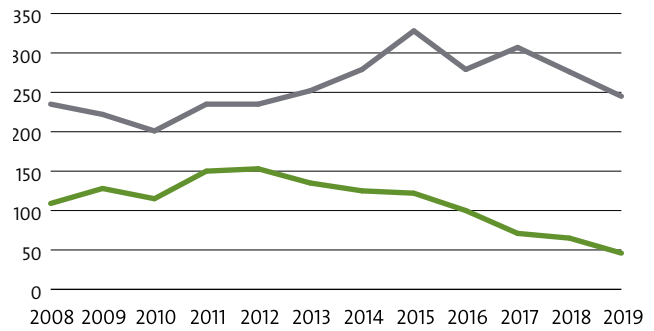


— Newly admitted to research education, 4 years (doctoral degree)  
 — Newly admitted to research education, 2 years (licentiate degree)

Source: Ladok

Figure 11

Licentiate and doctorate degrees 2008–2019



— Doctorate degrees awarded  
 — Licentiate degrees awarded

Source: Ladok

Figure 12

Newly admitted and registered research students 2016–2019

New students per research field	2019		2018		2017		2016	
	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men	Total	Proportion (%) of women/men
Biological Sciences	4	0/100	2	100/0	5	20/80	2	50/50
Computer and Information Science	65	15/85	55	33/67	45	20/80	43	37/63
Economics and Business	0	0	1	0/100	7	43/57	0	0
Electrical Engineering, Electronic Engineering, Information Engineering	47	30/70	45	29/71	54	19/81	50	16/84
Philosophy, Ethics and Religion	0	0	1	0/100	1	100/0	0	0
Physical Sciences	24	33/67	33	27/73	24	29/71	23	26/74
History and Archaeology	3	67/33	6	17/83	2	0/100	2	100/0
Health Sciences	3	67/33	6	50/50	7	57/43	7	14/86
Industrial Biotechnology	23	52/48	18	22/78	23	48/52	12	33/67
Chemical Sciences	9	22/78	10	30/70	11	45/55	18	39/61
Chemical Engineering	28	71/29	15	53/47	30	37/63	13	31/69
Arts	7	71/29	1	100/0	1	0/100	7	57/43
Mechanical Engineering	42	45/55	32	38/62	61	25/75	38	29/71
Mathematics	7	14/86	12	50/50	9	33/67	15	7/93
Materials Engineering	36	31/69	37	16/84	43	21/79	28	18/82
Medical Engineering	0	0	3	33/67	1	100/0	3	100/0
Environmental Engineering	2	0/100	2	0/100	2	50/50	3	67/33
Civil Engineering	23	35/65	23	43/57	25	32/68	25	44/56
Educational Sciences	10	90/10	5	20/80	4	25/75	3	0/100
<b>Total new research students</b>	<b>333</b>	<b>37/63</b>	<b>307</b>	<b>32/68</b>	<b>355</b>	<b>28/72</b>	<b>292</b>	<b>30/70</b>
<b>Total number of students registered</b>	<b>1,841</b>	<b>32/68</b>	<b>1,934</b>	<b>30/70</b>	<b>2,000</b>	<b>30/70</b>	<b>2</b>	<b>30/70</b>

Source: Ladok

Figure 13

## Doctorate and licentiate degrees 2016–2019

Doctorate degrees per research field	2019		2018		2017		2016	
	Total	Proportion (%) of	Total	Proportion (%) of	Total	Proportion (%) of	Total	Proportion (%) of
		women/men		women/men		women/men		women/men
Biological Sciences	2	50/50	1	100/0	3	0/100	6	50/50
Computer and Information Science	28	14/86	41	24/76	35	26/74	35	26/74
Economics and Business	1	100/0	1	0/100	8	38/63	12	50/50
Electrical Engineering, Electronic Engineering, Information Engineering	36	31/69	50	24/76	40	25/75	40	20/80
Philosophy, Ethics and Religion	1	0/100	2	0/100	1	0/100	1	0/100
Physical Sciences	18	22/78	28	11/89	24	29/71	19	16/84
History and Archaeology	1	0/100	1	100/0	4	50/50	0	0
Health Sciences	5	80/20	4	50/50	6	0/100	3	67/33
Industrial Biotechnology	19	63/37	14	57/43	20	40/60	8	38/62
Chemical Sciences	8	38/62	9	44/56	19	37/63	16	56/44
Chemical Engineering	32	34/66	21	33/67	15	53/47	20	55/45
Arts	0	0	6	83/17	2	0/100	3	100/0
Mechanical Engineering	29	48/52	35	31/69	40	13/87	21	19/81
Mathematics	10	20/80	9	22/78	7	14/86	10	10/90
Materials Engineering	18	17/83	26	23/77	36	36/64	38	13/87
Medical Engineering	6	0/100	2	100/0	4	50/50	4	0/100
Environmental Engineering	9	33/67	4	25/75	8	50/50	10	10/90
Civil Engineering	21	29/71	22	38/62	33	48/52	29	24/76
Educational Sciences	1	0/100	0	0	1	100/0	1	100/0
Other Engineering Technologies	0	0	0	0	1	100/0	3	33/67
<b>Total</b>	<b>245</b>	<b>32/68</b>	<b>276</b>	<b>30/70</b>	<b>307</b>	<b>32/68</b>	<b>279</b>	<b>28/72</b>

Licentiate degrees per research field	2019		2018		2017		2016	
	Total	Proportion (%) of	Total	Proportion (%) of	Total	Proportion (%) of	Total	Proportion (%) of
		women/men		women/men		women/men		women/men
Biological Sciences	0	0	3	33/67	0	0	1	100/0
Computer and Information Science	4	0/100	2	0/100	9	11/89	9	22/78
Economics and Business	1	100/0	0	0	1	100/0	1	100/0
Electrical Engineering, Electronic Engineering, Information Engineering	11	45/55	15	13/87	12	8/92	24	8/92
Philosophy, Ethics and Religion	0	0	0	0	2	0/100	0	0
Physical Sciences	2	0/100	3	100/0	4	25/75	5	40/60
History and Archaeology	0	0	0	0	1	100/0	0	0
Health Sciences	0	0	0	0	1	100/0	1	100/0
Industrial Biotechnology	1	100/0	2	100/0	2	50/50	2	50/50
Chemical Sciences	1	0/100	1	100/0	1	100/0	2	100/0
Chemical Engineering	3	0/100	0	0	5	20/80	3	33/67
Arts	1	100/0	1	0/100	1	0/100	0	0
Mechanical Engineering	4	0/100	7	43/57	4	75/25	7	57/43
Mathematics	1	100/0	2	50/50	2	50/50	3	0/100
Materials Engineering	6	17/83	12	25/75	6	17/83	15	33/67
Medical Engineering	0	0	1	100/0	0	0	0	0
Environmental Engineering	1	0/100	3	33/67	1	0/100	4	25/75
Civil Engineering	10	30/70	12	42/58	18	22/78	23	35/65
Educational Sciences	0	0	1	100/0	0	0	0	0
Other Engineering Technologies	0	0	0	0	1	0/100	0	0
<b>Total</b>	<b>46</b>	<b>28/72</b>	<b>65</b>	<b>37/63</b>	<b>71</b>	<b>25/75</b>	<b>100</b>	<b>31/69</b>

Source: Ladok

admitted to a doctoral programme or a programme that KTH offers in cooperation with one or more partners. The purpose of the doctoral programmes is to secure the quality of the educational programme via an organised structure of studies.

### **Student mobility within the programmes at the doctoral level**

The international element of KTH's educational programmes at the doctoral level is significant. Statistics Sweden requests information, on behalf of the Swedish Higher Education Authority, concerning stays abroad for those receiving doctoral degrees or licentiate degrees during the past year. The latest survey, conducted in 2018, showed that 30 percent of the newly graduated students had spent time abroad within the framework of their educational programme. KTH should improve the documentation of the doctoral students' stays abroad. There is also the potential for more doctoral students to spend time abroad during their course of studies.

### **Degrees**

In 2019, 245 (276) doctoral degrees and 46 (65) licentiate degrees were awarded. Of the doctoral degrees awarded, 32 (30) percent were to women and 68 (70) percent were to men. Of those who completed their licentiate degree, 28 (37) percent were women and 72 (63) percent were men. Of this year's doctoral degrees, eight (nine) were awarded jointly with other universities.

Earning a licentiate degree as a stage in your education at doctoral level, and thereby obtaining a natural validation of studies completed so far, remains relatively common at KTH. Of the doctoral degrees awarded in 2019, 22 (24) percent of the students have previously earned licentiate degree. KTH's assessment is that a licentiate degree such as a Degree of Licentiate of Science is highly relevant to employment in industry.

The net time as a doctoral student for doctoral students who graduated in 2019 was 4.3 (4.3) years for the doctoral degree, and 2.8 (2.6) years for the licentiate degree. For both licentiate degrees and doctoral degrees, men have a slightly shorter net time spent as a doctoral student than women. The calculations of the time spent as a graduate student are produced according to the procedures provided by the Ladok study documentation system.

## **National collaborations**

### **Prerequisites for educational collaborations**

According to KTH's Development Plan for 2018–2023, KTH will deepen and expand its international partnerships. Joint collaborations will contribute to KTH's development in terms of both education and research. KTH has a large number of educational collaborations, both national and international. KTH has developed an internal regulatory framework as well

as support documents and procedures that are used in the planning of educational collaborations. The preparatory group for educational collaborations, which has been active since 2015, has developed extensive knowledge concerning the preconditions for educational collaborations, and offers support to KTH's Schools.

### **Teacher education programmes**

#### ***Master of Science in Engineering and Education***

The educational programme in engineering and education has been given since 2011 in cooperation with Stockholm University (SU). The programme leads to both a Degree of Master of Science in Engineering as well as a Degree of Master of Science in Secondary Education for work in the field of mathematics plus one of the subjects of physics, chemistry and technology. KTH has degree-awarding powers for both degrees. In autumn term 2019, the programme had 96 first choice applicants and 448 applicants in total. 53 students commenced the programme, of whom 45 percent were women and 55 percent were men. During 2019, 35 students graduated from the programme, of whom 54 percent were women and 46 percent were men. Two of these students have completed the educational programme in engineering and education which was offered between 2002–2010. This was an educational programme based on a commission from the Swedish Government (U2002/1041/UH). KTH did not have degree-awarding powers for the Degree of Master of Science in Secondary Education during the years this programme was being offered, but rather those who completed the programme would obtain a Degree of Master of Science in Secondary Education from SU and a Degree of Master of Science in Engineering from KTH.

All students in the engineering and education programme have mathematics as their first teaching subject. During the first year of the programme, the students gain basic knowledge in the subjects that are included in the programme's various majors. The subjects are physics, chemistry and technology, with a specialisation in information and communication technology or a specialisation in energy and the environment. Before starting the second year, they are free to choose between four majors (specialisations) that offer the second subject field. In connection with the choice of major, the students are notified that there is strong demand for teachers in all these subject fields. The largest teacher shortages are in chemistry and technology. As a consequence of the shortage of teachers, it has been difficult since 2017 to find sufficient places for practical internships in upper secondary schools, in particular in the field of mathematics. In 2019, everyone who needed a practical internship received a placement, although 17 students in their first year of study were placed in lower secondary schools teaching mathematics.



### ***Degree of Master of Science in Secondary Education Programme***

The Degree of Master of Science in Secondary Education with a specialisation in technology comprises 270 credits and commenced in the autumn term 2019. The programme had 42 applicants, six of whom started the programme. The programme leads to two different academic degrees, a Degree of Master of Science in Secondary Education with a focus on work in the lower secondary school grades 7–9 in the fields of technology and mathematics and a Degree of Bachelor of Science in Engineering. The educational programme includes four years of full-time studies and two summer terms, and is located at both KTH Södertälje and KTH Campus.

### ***Bridging teacher education programme***

The supplementary teacher training educational programme (KPU) comprises 90 higher education credits and leads to a Degree of Master of Science in Upper Secondary Education or the Degree of Master of Science in Secondary Education in lower secondary school grades 7–9 for teaching in one or more of the subject fields of physics, chemistry, mathematics or technology. In order to be admitted to the programme, it is necessary to have sufficient academic qualifications in one or more of these subject fields. Supplementary teacher training at KTH commenced for the first time in June 2016. The programme is partially given as distance learning, with teaching at KTH a few days per month. Other time is devoted to self-study and teaching via a web platform. Some parts of the teacher training programme are given by SU. The programme is also in progress during the summer months, which means that a student who starts in June can be a finished teacher at the end of August the following year. One-third of the educational programme consists of an on-site internship at a school where the students participate in the daily work under supervision.

According to the assignment in the 2016 regulatory letter, the number of beginners on the KPU programme was to increase by 20 for 2015 and 2016, compared to 2014. This target was achieved in 2016 and the number of beginners in subsequent years has been at a higher level than the assignment. See *figure 2* for the number of beginners.

There were 120 applicants in 2019, of whom 101 were first-choice applicants. 69 applicants were accepted and 29 students started the programme. At the end of the autumn term, 25 are still active. The most common reason for dropping out is that the student has found work in his/her previous profession. Several students who were admitted in 2016 and 2017 have not yet completed their degree projects. In 2019, 19 students graduated.

### ***Bridging teacher education programme (KPU) for third-cycle graduates***

KPU for individuals with a doctoral degree is operated by

KTH and SU jointly, and leads to a joint degree. The programme is part of a project that is running between 2016–2021 and aims to educate 250 specialist subject teachers during the period. Other participating institutions are Karlstad University and Umeå University. Those who are admitted to the programme have the opportunity to receive a special educational programme financial allowance during their studies. The number of student slots in the educational programme is governed by the allocation of educational grants, which is limited to 50 students per year. Of these, 18 can be admitted in Stockholm.

The programme encompasses 90 credits and runs over twelve months with an accelerated pace of study. For the admission in January 2019, a total of 220 applicants (of whom 135 were first-choice applicants) applied for 18 planned student slots. The arrangement of the training grant means that no excess intake can take place. 15 students started the programme.

In February–March 2019, a programme evaluation survey was conducted with the students from the second round (2018). Eight of the 16 students who completed the entire programme responded to the survey. They were mainly positive about the programme, above all in relation to the practical internship element and the courses in subject didactics. The most important objection by the respondents relates to the fact that several question the usefulness of a degree project and the organisation surrounding its implementation. The first round of the programme was heavily criticised for poor coordination between KTH and SU, as well as for uncertainties regarding the schedule and digital aids. No such criticism emerged this time. During 2019, 12 students have graduated from the programme, four women and eight men.

### **Joint collaborations with university colleges of fine, applied and performing arts**

KTH is working to develop the joint collaborations with university colleges of fine, applied and performing arts, in particular Konstfack (University of Arts, Crafts and Design).

In order to offer doctoral students, academic supervisors and researchers a high-quality, shared environment, a centre was established in 2019, called Navet. The centre works to strengthen research in the field of art, technology and design, as well as to establish this subject as a field. KTH, Konstfack, the Royal College of Music in Stockholm and Stockholm University of the Arts all work in collaboration at Navet.

### **Stockholm Trio University Alliance**

In order to make full use of the potential of Karolinska Institutet's, KTH's and Stockholm University's joint academic environment, the partners have entered into an agreement on enhanced cooperation within the framework of the Stockholm Trio. An agreement was also reached in Brussels during the year regarding joint representation. The main

purpose of an office in Brussels is to increase the visibility of the Stockholm Trio in Europe. Through active advocacy, the participation of higher education institutions in various EU projects will be promoted, thereby contributing to a European policy for research, innovation and education.

### Other joint collaborations

In January 2011, KTH and Mid Sweden University reached an agreement to jointly strengthen the educational programme leading to the Degree of Master of Science in Engineering. The agreement has been extended and now remains in effect until 2021. The collaboration means that students, after the first three years of the Degree of Master of Science in Engineering programme for which Mid Sweden University is responsible, can continue on certain programmes leading to a master's degree at KTH. In the autumn term 2019, 20 (15) students from Mid Sweden University began a master's degree programme at KTH. Work is underway to convert parts of the collaboration into a joint Master of Science in Engineering in technical chemistry that will lead to a joint degree.

KTH and SU entered into an agreement in 2012 on a joint educational programme at the master's level in mathematics, which leads to a joint degree. In the autumn of 2019, 21 (40) students commenced the programme and nine students graduated with a degree during the year.

A three-party cooperation in the educational programme between KTH, Karolinska Institutet (KI) and SU was established in 2014, with the starting point in Science for Life Laboratory in Stockholm. The educational collaboration takes place within the framework of a master's degree programme leading to a joint degree. The first students started in autumn 2015. In the autumn of 2019, 25 (32) students commenced the programme and 22 graduated with a degree during the year.

Since 2014, KTH and KI have been operating a joint educational programme at the doctoral level in medical technology. The collaboration leads to a joint degree. No doctoral students were admitted in 2019. Two doctoral degrees were awarded during the year within the collaboration.

## International collaborations

### Strategic collaborative partners and networks

In 2019, KTH has extended its collaborations with five strategic partner universities: the University of Illinois at Urbana-Champaign in the USA, Nanyang Technological University in Singapore, Shanghai Jiao Tong University in China, Hong Kong University of Science and Technology in Hong Kong and the University of Tokyo in Japan. The partnership with the University of Tokyo is taking place along with Karolinska Institutet and Stockholm University. Joint initiatives have been launched within both education and

research. Experience has clearly shown that financing for the start of joint projects as well as mobility have a good effect. During the latter part of 2019, a strategic collaborative partner agreement was also entered into with a sixth university, the Indian Institute of Technology Madras in India.

During the year, KTH has continued to engage in the CESAER network (Conference of European Schools for Advanced Engineering and Education). The focus is on policy issues in education and research, and CESAER represents the technical universities in matters related to European research funding, for example. In 2019, KTH's President has been the first Vice Chairman of CESAER's Governing Board.

NORDTEK is a network of presidents and deans from technical universities and faculties in the Nordic and Baltic countries. The members represent 30 universities and 120,000 students. In 2019, KTH, together with NORDTEK, arranged the 47th NORDTEK conference on the theme of Innovation meets research – how universities can increase societal impact through innovation.

In October, KTH took over the chairmanship of the university network T.I.M.E., Top International Managers in Engineering, which has 57 member universities. The primary activity for this network is student exchanges, where the students are encouraged to study for degrees from two universities through special exchange agreements. Over the next two years, KTH, in its role of chairman, will particularly drive the development of internationalisation at graduate level as well as collaborative activities with companies.

Within the European network CLUSTER, the Consortium Linking Universities of Science and Technology for Education and Research, KTH coordinates the Grants and Applications Support Team subgroup. During the year, it has supported joint project applications within Erasmus+.

### European Institute of Innovation and Technology, EIT

KTH is now participating in five out of eight consortia in the large-scale EU investment in EIT. The areas in which KTH is participating through EIT's knowledge and innovation communities (KIC) are ICT (EIT Digital), Energy (EIT InnoEnergy), Materials (EIT Raw Materials), Health (EIT Health) and, launching at the end of 2018, Transport Systems (EIT Urban Mobility). For the latter, the work in 2019 has largely focused on the design of a new Master's school, with the first students being admitted in autumn 2020. Like EIT Digital, KTH will be responsible for the coordination of the Master's school. Interest in master's programmes within the framework of EIT remains strong. The number of applications has increased compared to the previous year. During the year, 887 (760) applicants were accepted onto EIT Digital's master's programme and 374 (375) students began their studies at one of the 17 partner universities now included in the consortium, of whom 27 (25) percent were women and 73 (75) percent were men. The students come from 46 different countries. Of these

374, 73 (81) began their studies in year 1 at KTH. After spending their first year of study at one of the partner universities, 125 (80) students began their second academic year at KTH in 2019. KTH's main involvement in EIT Digital is still the Master's school. One new initiative for 2019 was an effort to recruit externally employed doctoral students within the framework of EIT Digital. There is clear interest from industry regarding a collaboration with KTH.

KTH is participating in five of the Master's programmes offered within EIT InnoEnergy. In autumn 2019, 80 (102) students began their first year at KTH. 41 (42) students began the second year of their studies at KTH after a year at one of the partner universities.

Within EIT Health, the decision was taken to finance a new Master's programme in innovative technology for a healthy living environment, starting in the autumn term of 2020. The programme will be led by KTH in collaboration with five other universities. The doctoral programme BEhealsy, in the field of biomedical engineering and health systems, which is led by KTH, took place during the year and will also continue next year.

Within EIT Raw Materials, the main focus is now on courses and study programmes with a particular focus on sustainability issues, such as life cycle analysis, recycling and replacement of critical raw materials.

### Erasmus+

As in previous years, KTH received a large number of scholarships for mobility within Europe for studies, internships and staff exchanges. In the 2019 call for proposals within Erasmus+, KTH was awarded funds for a total of 13 projects as coordinator or partner, which is a more than the previous year.

In the area of capacity building, KTH will participate in three new projects as a partner. These new projects have a geographical spread that includes Ukraine, Mozambique and Sri Lanka. In total, KTH is participating in 36 (33) projects within Erasmus+ capacity building, five of which as coordinator. The projects concern the development of new courses in technology, the environment and sustainable development, climate change, industrial paradigm 4.0, circular economy, e-learning, smart campuses, geographical information systems, business systems and development of infrastructure to support academic researchers, students, innovations and university administration.

Within the Erasmus+ knowledge alliances, two projects have been granted with KTH as partner. Within the Erasmus+ strategic partnerships, KTH is included in 15 (10) projects. The new projects that were granted in 2019 related e.g. to European industry 4.0, digital global engineers, energy and women's participation in MOOC courses in science, technology and mathematics.

A total of five (20) Erasmus Mundus Joint Master's students were registered in 2019. KTH is participating as a

partner in one Erasmus Mundus Joint Master's degree programme. Three of the five doctoral programmes within Erasmus Mundus have been finalised and the other two are continuing with no new admissions with public thesis defences until 2020.

### European Universities – UNITE!

Within the framework of the European Commission's European Universities initiative, KTH is part of the UNITE! alliance (University Network for Innovation, Technology and Engineering), along with six partner universities from the CLUSTER network. The aim of the European Commission is to significantly improve mobility opportunities for all student groups and all staff, and to ensure quality and competitiveness through European cooperation. The work within UNITE! is organised into ten sub-projects, of which KTH is responsible for the sub-project Mobility for all students.

### Marie Skłodowska-Curie Actions

Marie Skłodowska-Curie Actions, MSCA, is the EU's programme for academic researcher mobility. KTH's researchers have been invited to a large number of applications in 2019. Within Innovative Training Networks, six (six) new projects in which KTH is participating were granted to support doctoral students. Within Individual Fellowships, four (six) new postdocs were granted to KTH. In total, KTH is participating in more than 60 (45) projects within the programme.

### KTH Global Development Hub

KTH Global Development Hub (GDH) supports the development of challenge-driven education within KTH and partner universities in eastern and southern Africa. GDH currently has partnerships with four universities in Kenya, Tanzania, Rwanda and Botswana. During 2019, a total of 31 students from KTH and the partner universities participated in the exchange and conducted projects based on locally formulated challenges. During the year, approximately 60 teachers at KTH and the partner universities were trained in accordance with GDH concept for challenge-driven education, and 13 courses have been developed in connection with this.

### South Africa Sweden University Forum

KTH is participating in the South Africa Sweden University Forum (SASUF), a STINT-funded project that is coordinated by Uppsala University. SASUF's main objective is to strengthen ties between Sweden and South Africa through research, education and innovation. During the year, KTH's President took part in a Research and Innovation week in South Africa alongside the Vice President and academic researchers from KTH. A total of 1,000 people from 36 different universities participated during the week, which ended with seminars linked to the Global Sustainability Goals.

**China Scholarship Council**

During the year, 20 doctoral students with a scholarship from the China Scholarship Council (CSC) have been admitted to KTH. 14 guest doctoral students, one postdoc and six guest researchers have also been awarded scholarships.

**Linnaeus-Palme**

Linnaeus-Palme is a SIDA-financed exchange programme with the focus on stimulating bilateral exchanges between universities and other educational institutions in Sweden and developing countries. KTH applied for three (three) Linnaeus Palme projects for 2019, of which two (three) were approved and awarded funding for student and teacher exchanges in the fields of energy engineering and health informatics.

# Research

## Objectives

According to the Development Plan for 2018–2023, KTH is to be characterised by world-leading research. Applied research is to be strengthened and given greater depth by means of curiosity-driven basic research and interdisciplinary/multidisciplinary collaborations. The innovative and cutting edge research that is being conducted in a number of fields is to be clearly highlighted both externally and internally. Relevant and appropriate infrastructure is of fundamental importance for prominent research. During the period, KTH will therefore produce an inventory of the need for investments, and ensure that the infrastructure is used as effectively and broadly as possible.

## External funding for research

KTH has a high proportion of external funding, both from the public sector as well as from other parties in Sweden and abroad. Swedish and foreign companies contribute to the external financing by means of involvement in a wide range of research projects. For the past several years, KTH has been working to establish strong strategic partnerships with companies, where research funding becomes part of the joint collaboration, for example via centres or research projects. In most cases, however, the cooperative efforts with the business community do not mean that the financing is actually from the companies, but rather is based on the fact that they contribute with work input. See the *Collaborations* section.

## International research funding

International research funding accounts for around ten percent of the research revenue. The EU is the main source of funding. KTH also receives research funding from other funding providers within Europe and the USA, as well as from the UN, for example.

## EU funding

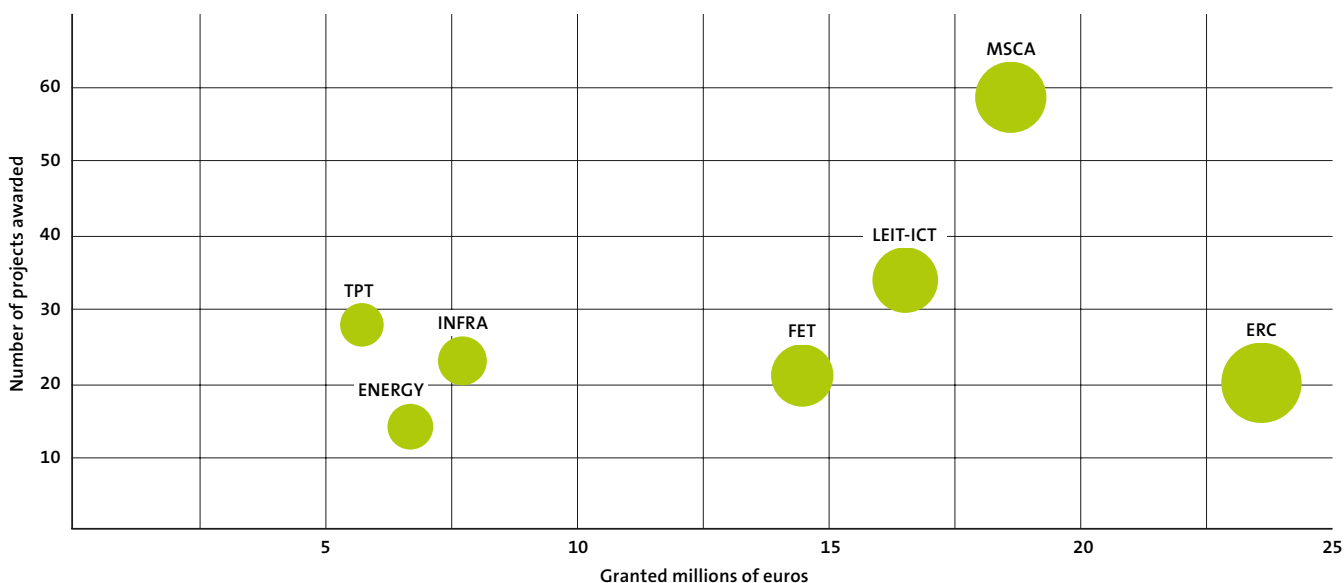
Within the EU's framework programme Horizon 2020, the last work programme for 2018–2020 is ongoing. KTH is the Swedish university that received the most projects from Horizon 2020, with 255 projects so far. In terms of funding, KTH is ranked third among Swedish participants in Horizon 2020, with just over 120 million euros in EU funding during the period 2014–2019.

In order to increase KTH's research grants from the EU, KTH has conducted a number of support activities. These include a workshop for each open call from the European Research Council (ERC), the seminar Introduction to EU funding and the lecture How to write successful grant applications, as well as an Impact workshop for the SERC strategic research area. Within the framework of the strategic collaboration with the City of Stockholm, KTH has carried out the application workshop for Horizon 2020 on three occasions. With the Crowdhelix network, KTH, together with the platform Life Science Technology and Karolinska Institutet, arranged a major event in the field of health and selected Horizon 2020 calls. Within the Nordic5Tech collaboration, a Horizon 2020 course has been conducted

Figure 14

### KTH-projects within Horizon 2020 (2014–2019)

Research fields with most awarded grants at KTH



ERC European Research Council (individual pioneering research)  
 MSCA Marie-Skłodowska-Curie Actions (researcher mobility)  
 LEIT-ICT Information and communication technologies  
 FET Future and Emerging Technologies

INFRA Research Infrastructure  
 ENERGY Secure, clean and efficient energy  
 TPT Smart, green and integrated transport

Source: Horizon 2020 dashboard

with three participating researchers per university.

In 2019, KTH has submitted around 300 applications to Horizon 2020, of which 35 have been granted. Divided into the various programmes, five are found in the ERC (individual groundbreaking research), ten within Marie Skłodowska Curie Actions (academic researcher mobility), and 20 within the rest of Horizon 2020. Within other EU funding, 14 projects have been granted during the year.

Maria Cuartero Botia, CBH, and Outi Tammissola, SCI, have been awarded ERC Starting Grants, which are given to young researchers. Maria Cuartero, who is carrying out research in applied physical chemistry, is receiving SEK 17 million for a project that is investigating and developing ion sensing. Outi Tammissola, a researcher in flow mechanics, is receiving SEK 16 million to increase understanding of complex flows through analysis and simulations. These projects span five years.

Dimos Dimarogonas and Bob Sturm, EECS, have been awarded ERC Consolidator Grants, which are given to applicants who have the potential to become world leaders in their field. Dimos Dimarogonas, who has previously also received ERC Starting Grants, will be developing systems within the LEAFHOUND project whereby robots can process information from their surroundings and make flexible decisions based on what happens. Bob Sturm is being granted funds for the MUSAIC project, regarding how music can be created through computers and artificial intelligence. The grants amount to SEK 22.5 million each and extend over five years.

Aristides Gionis, EECS, received an ERC Advanced Grant in 2018 for his research at Aalto University in Finland. Aristides Gionis has been recruited to KTH in 2019 and his ERC Advanced Grant REBOUND, research in computer science with a focus on artificial intelligence and data mining, will therefore be coming to KTH. The project will be starting in 2020 and is a five-year grant totalling SEK 28 million.

*Figure 14* shows the distribution and funding of KTH's projects to date within Horizon 2020 (2014–2019) for the areas where KTH been granted the most money.

### National external financing

External research funding from Swedish funders regarding the type of research that is being supported, which instruments are used, and which funders may have an interest, is continuing to follow the same direction as in recent years. KTH has continued to be successful over the year in obtaining funding from the Swedish Research Council's major request for proposals, which largely supports basic research.

In order to increase KTH's national external funding, KTH has conducted a number of support activities in the form of seminars, workshops and individual counselling during 2019. For example, the Swedish Foundation for Strategic Research, the Swedish Research Council, Vinnova and the strategic innovation programme Viable Cities have been invited to talk about calls they are offering that are aimed at KTH researchers.

In 2019, the **Swedish Research Council** awarded KTH grants of SEK 267 million, of which SEK 177 million was awarded within the major call for science and technology. KTH was one of the institutions of higher education that received the most funding within this call.

In the Swedish Research Council's call Grants for research infrastructure of national interest in 2019, two grants were awarded with KTH as the principal: the National Genomics Infrastructure (NGI) and the National Microscopy Infrastructure (NMI). NGI spans the period 2021–2024 and is allocated SEK 80 million. NMI spans the period 2020–2024 and has been granted SEK 40 million. KTH is also a party to four additional national research infrastructures that have been granted.

Danica Kragic Jensfelt, EECS, is one of a total of eight researchers in Sweden who have been awarded funding from the Swedish Research Council's Distinguished Professors Programme. The grant runs from 2019 to 2029 and amounts to SEK 47 million. Danica Kragic Jensfelt will work with learning/interactive autonomous systems within robotics and automation.

The Swedish Research Council has decided that Tage Erlander's visiting professorship in 2020 will be held by Zhi-Xun Shen, professor of physics at Stanford University in the United States. During his time in Sweden, Zhi-Xun Shen will be active at the School of Engineering Science (SCI). The allocation of funding for the visiting professorship amounts to SEK 2.2 million.

**Knut and Alice Wallenbergs Foundation** has granted SEK 25 million to Lars Berglund, School of Engineering Sciences in Chemistry, CBH, together with employees at KTH, Chalmers University of Technology and Luleå University of Technology. The funds will be used for research on biocomposites during the period 2019–2022.

The Wallenberg AI, Autonomous Systems and Software Programme (WASP) has been extended by three years and is receiving an additional grant of SEK 1.3 billion. The programme now spans the period 2014–2029 and has a total budget of SEK 5.5 billion. Linköping University is the principal for the programme, which is being run together with KTH, Lund University, Umeå University, Chalmers University of Technology and industry. The initiative has enabled the recruitment of prominent researchers who are starting up new research groups at the universities. Benoit Baudry, Martin Monperrus and Aristides Gionis, all at EECS, have been recruited to KTH as part of the programme. In 2019, the Foundation has also granted support amounting to SEK 5 million, over a five-year period, to Aristides Gionis, EECS, as part of the initiative regarding artificial intelligence within WASP. The funds relate to support for postdoctoral recruitment.

Marina Petrova, EECS, and Sara Zahedi, SCI, have been appointed Wallenberg Academy Fellows. The grants allow

them to immerse themselves in their research areas for five years. Marina Petrova, who is researching expanded bandwidth in next generation networks (5G), is receiving SEK 7.5 million. Sara Zahedi, who will be developing new calculation methods and combining these with deep learning to create simulation tools that can be used in processes that include a very wide range of dynamic objects, is receiving SEK 5 million. Petter Brändén, SCI, will continue to receive funding as a Wallenberg Academy Fellow, totalling SEK 9 million over a five-year period.

KTH researchers receive more than half the funding in the KAW Foundation's investment in prominent mathematicians, with eight out of 15 grants.

The Foundation has also decided to support the Wallenberg Center for Protein Research with SEK 160 million during the period 2020–2023 and the Wallenberg Wood Science Center 2.0 with SEK 160 million during the period 2019–2022.

**Marianne and Marcus Wallenbergs Foundation** has provide a grant of SEK 6 million to enhance research within the social sciences. This funding is going to Kristina Höök, EECS, who will be investigating how drones can affect people's everyday lives. The project will last for five years.

**Vinnova** (the Swedish Governmental Agency for Innovation Systems) is an important external research financier, and has awarded grants totalling SEK 100 million to KTH in 2019. In Vinnova's call for a competence centre, funds were granted to TECOSA (Trustworthy Edge Computing Systems and Applications), where KTH is the principal.

**The Swedish Foundation for Strategic Research (SSF)** has, in its anniversary call SSF Sabbaticals, granted Ilaria Testa, SCI, as one of a total of eight researchers, funds for a period abroad in a research field other than her own. Ilaria Testa is looking at optical nanoscopy in order to get a full picture of the role of mitochondria in the cells. The project is being awarded just over SEK 2 million and will be conducted at Calico Life Sciences, California and USA.

SSF has granted SwedNess-II, the Swedish graduate school in neutron distribution, an additional SEK 100 million over the next five years. KTH is extremely committed to the graduate school, for which Uppsala University is the principal.

### Prizes and awards for KTH researchers

Christian Ohm, SCI, and Johan Rockberg, CBH, have been elected to the Young Academy of Sweden. The Academy is an independent forum for young, leading researchers from all fields of research. Membership is limited to five years.

Four researchers at KTH have been awarded prizes from Göran Gustafsson's foundations, which are given to young researchers at KTH and Uppsala University. The four researchers come from the School of Engineering Science

(SCI). Karim Adiprasito and Klaus Jöns are each receiving research grants amounting to SEK 2.7 million, which may be used over a three-year period. Patrick Henning and Lilian Matthiesen are receiving Göran Gustafsson's small prize, amounting to SEK 750,000 each.

Johan Silfwerbrand, ABE, has been awarded The Wason Medal for Most Meritorious Paper 2019 by the American Concrete Institute (ACI). He is receiving the prize for his article Bonded Concrete Overlays.

Mikael Skoglund, EECS, has been named an IEEE (Institute of Electrical and Electronics Engineers) Fellow. Skoglund is receiving this distinction for his significant contributions in the fields of source and channel coding as well as wireless communication. In Class of 2019, Skoglund was the only person from Sweden to receive the award.

Linus Salö, ABE, has been presented with the 2019 Erik Wellander research award. The award amounts to SEK 50,000, and he is receiving it because he has "empirically increased knowledge about and theoretically deepened the understanding of the use of the Swedish language in scientific and academic contexts".

Carlota Canalias, SCI, is receiving an award for her efforts based on the use of research funded by the Foundation for Strategic Research. The award amounts to SEK 75,000, and she is receiving the distinction for her project Tailored Photons.

Svein Kleiven, Peter Halldin and Hans von Holst, CBH, are receiving the Polhem Prize 2019 for MIPS – a helmet technology that imitates the brain's own protective system and reduces the risk of brain damage.

Per-Olof Syrén, CBH, has been awarded the 2019 Skills Development Prize from the Gunnar Sundblad Research Foundation. Syrén is receiving the prize for having introduced a unique approach to the production of biopolymers from the forestry industry's by-streams.

Johan Håstad, SCI, has been appointed a Fellow of the Association for Computing Machinery trade association. Members are elected to the organisation based on professional experience, performance and contributions to the development of computer sciences in the service of society.

Prosun Bhattacharya, ABE, has been awarded a Fellowship from the International Water Association (IWA). Bhattacharya is receiving this award for his significant contributions to water research, particularly relating to arsenic in drinking water, which is a public health issue for millions of people.

Philipp Haller, EECS, has received the Programming Languages Software Award from ACM (Association for Computing Machinery). Haller is receiving the award for highly skilled software development of the Scala programming language.

### Centres and other special initiatives

Research centres are important for developing competitive research environments with relevant problems and for

contributing networks for academic researchers. A centre is a neutral collaboration platform where different parties agree on a common activities plan and contribute resources for implementation. KTH has more than 50 centres, and some of the new ones are described below.

In 2019, the Center for X-rays in Swedish Materials Science (CeXS) was inaugurated. The centre will contribute to the increased use of beam-power tubes for synchrotron research at the Petra III research infrastructure in Hamburg, and is aimed at Swedish researchers in all disciplines. KTH is the principal with Linköping University as a party. The centre receives funding from the Swedish Research Council and the various parties, totalling SEK 2.3 million per year during the period 2019–2021.

The Swedish Electromobility Center (SEC), with Chalmers as principal and KTH as a party, has been granted extended funding from the Swedish Energy Agency for the years 2019–2023. The budget granted for stage IV amounts to sek 54 million for the entire period.

In June, Vinnova awarded funding to the TECoSA (Trustworthy Edge Computing Systems and Applications) competence centre, with KTH as the principal. TECOSA focuses on edge computing, which is computing power provided locally in relation to users and embedded systems, distributed to the edge of Internet/cloud solutions. TECOSA is expected to commence operations in January 2020 and has been granted funding for five years. In addition to TECOSA,

KTH is a party to a further three of the eight competence centres to which Vinnova granted funds, each of which has a five-year budget of approximately SEK 100 million. During 2019, a collaboration has been established with the Swedish Armed Forces, which has resulted in the creation of the Centre for Cyber Defence and Information Security (CDIS) with a total budget of SEK 46 million over four years.

KTH has joined the Centre for Medical Nanosciences, with Karolinska Institutet as the principal. This centre is a three-year initiative with funding from KTH and Karolinska Institutet totalling SEK 6 million per year, where interdisciplinary research in the fields of technology, materials science and medicine will develop new knowledge within the nanomedical sciences.

Collaboration in respect of medical and technical research is being conducted within MedTechLabs, a centre involving the parties Region Stockholm and Karolinska Institutet. During 2019, two new research programmes have been launched with a focus on AI and bioelectronic medicine, with applications for breast cancer and inflammatory disease. The programmes encompass SEK 35 million over five years and entail a doubling of the current funding.

During 2019, the Swedish Centre for Nuclear Technology (SKC), with KTH as the principal, has developed a new programme for the period 2020–2023. SKC's task is to promote the long-term development and stability of educational and research resources at Swedish universities and

Figure 15

## Professors 2019

**Newly appointed professors (externally recruited)**

Experimental Space Plasma Physics  
Mathematics

**Direct appointed**

Computer Science With Specialization In Artificial Intelligence And Data Mining  
Theoretical Physics With Specialization In Particle Physics

**Promoted to professor**

Computer systems  
Space plasma physics  
Industrial management with specialization in leadership and organization  
Manufacturing processes theory and management  
History of technology with orientation towards information infrastructure  
Electronic systems design with specialization in dependable, autonomous systems  
Engineering education policy and management  
Theoretical biophysics  
Project communication  
Materials physics  
Fluid mechanics  
Machine-to-machine communications  
Molecular biosciences with focus on protein technology  
Applied physics  
Polymer technology with orientation towards polymer chemistry

Wireless sensor networks  
Lightweight structures  
Urban and regional studies  
Material science  
Solid mechanics  
Computational catalysis  
Fluid mechanics with specialization in flow control  
Mathematics  
Cell biology proteomics

**Newly appointed visiting professors**

Chemistry of materials  
Real estate law  
Mathematics  
Chemical engineering with special emphasis on energy systems analysis and thermochemical conversion of biomass

**Newly appointed adjunct professors**

Real estate economics  
Semiconductor technology  
Tribiochemistry  
Multiantenna systems  
High-energy synchrotron radiation for materials characterization

Source: HR+



institutions of higher education in subjects that are relevant from a nuclear technology perspective. The budget for the next four years is SEK 52 million, of which the Swedish Radiation Safety Authority is contributing around 40 percent, with industrial parties providing the remainder. Financial support is being provided for activities at the academic partners KTH, Chalmers University of Technology and Uppsala University.

The Center for Mechanics and Material Design (MMD) was established in December. The centre gathers research and education that integrates and develops the borderland between materials science and material mechanics. KTH and industrial partners are investing SEK 27 million over four years.

During 2019, the Linnaeus Centres ACCESS, FLOW and ADOPT at KTH have been wound up, following the conclusion of the Swedish Research Council's funding and the centres' mandate period. The Swedish Research Council has evaluated all the Linnaeus centres during 2018 and 2019, and KTH is awaiting final reports from the Swedish Research Council as well as the implementation of an international evaluation in 2020.

### Management skills in collaborations

Research funders and collaborative partners are placing ever higher demands on KTH to promote sustainable development, gender equality, open data, integrity issues, utilisation and management of intellectual property assets, etc. A series of seminars and workshops has continued within KTH. The aim is to increase skills and exchanges between collaborators and other relevant staff. The seminar series is principally aimed at research collaborators regarding major or strategic research initiatives at KTH. The seminars have dealt with issues concerning the data protection regulation and open data, sustainable development and global sustainability goals, IP management and gender issues, as well as communication in research.

In parallel with this, KTH is developing the programme "Leaders for collaborative research" in the form of e-learning. As an initial pilot, an IP management module is being developed for the Vinnova-funded IMP project ("Implementation of working methods and increased knowledge in the field of knowledge assets and intellectual property rights – for strengthened collaboration and social responsibility at the universities"). Additional course modules will be developed and implemented.

### Strategic research areas

The investment in strategic research areas (SRA) has been ongoing since 2010. KTH is participating in ten out of a total of 43 strategic research areas and is the principal for five of them. In its role as principal, KTH has received a total of SEK 2 billion in grants for SRA activities during the period 2010–2019, including SEK 235 million for 2019. Within KTH, several new interdisciplinary and internationally successful rese-

arch fields have emerged through strategic investment in the recruitment of assistant professors with SRA funding. At a national level, the SRA structure has created natural incentives for institutions of higher education to develop strong research fields, as interdisciplinary collaborations between different disciplines are required in order to achieve excellence. This allows Sweden's combined research resources to be utilised optimally.

KTH plays a leading role in five national strategic research areas: IT and mobile communication, transport, production, e-science and molecular life sciences. Since there have been no follow-up directives from the Swedish government since 2015, KTH has worked to promote quality based on the recommendations made in conjunction with the 2015 evaluation results. This work has taken place through the development of strategic plans up to the year 2022, bibliometric follow-ups, the monitoring of societal impact through impact case studies as well as links to education. Furthermore, knowledge transfer between the representatives of each strategic research area is being created through recurring dialogues.

**The strategic research ICT TNG** (Information and Communication Technology – the Next Generation) has continued to develop strong interdisciplinary research between KTH, Stockholm University and the Research Institutes of Sweden (RISE). A follow-up to ICT TNG's findings indicates that the strategic research area has had a significant impact on scientific developments over the past decade in this area. ICT TNG researchers have published almost 2,000 articles listed in the Web of Science, with normalised citation results roughly twice as high as the KTH average. External research grants that have been received by the ICT TNG faculty in competition increased from SEK 102 million in 2010 to SEK 276 million in 2018. Several of these are prestigious grants, such as VR Distinguished Professor scholarships, ERC grants, SSF future research leaders, KAW Wallenberg Scholars and Academy Fellows. In addition, a major initiative has been conducted during the year aimed at laying the foundations for the new research environment in digitalisation, KTH Digital Futures.

**The strategic research area TRENOP**, research for new transport solutions, has announced six new faculty positions during the year, one of which in the field of railway systems is already in place. A national agenda, Green Infrastructure Material Innovations, has been established, enabling structural support for innovation projects in the field of transport infrastructure. The project ELISA has also started during the year, the aim of which is to demonstrate how smart ports (automation within transport, smart roads, AI) can support sustainability in critical infrastructure. KTH-MIT Senseable Stockholm Lab has been established with four new research projects in collaboration with the TRENOP

strategic research area. The aim is to explore how Big Data, AI and machine learning can integrate urban technology, urban science and design.

**The strategic research area XPRES** for excellence in production research underwent a radical organisational change in 2015, which has resulted in a positive development. Its primary focus now is on creating the conditions for a new paradigm shift within production by integrating sustainability and digitalisation efforts. Since its launch, the XPRES faculty has increased its external funding by 60 percent to almost SEK 900 million through the receipt of grants in competition from e.g. the EU's Horizon 2020 framework programme, Vinnova and the Swedish Research Council. During the period 2015–2019, eleven faculty positions have been filled using XPRES funding. The collaboration with industry has been stepped up and has led to increased mobility within Europe through new projects such as ICARUS, maestro and DiMAND support – focusing on the transfer of technology transfer to SMEs.

**The strategic research area seRC**, research in e-science, launched SeRC 2.0 in 2019, which consists of an inclusive process for focusing joint funding even more on interdisciplinary collaboration and computer science. With six multidisciplinary collaboration programmes (MCP), seRC is continuing to integrate e-science into traditional Swedish research. The idea of MCPs is to achieve added value through collaboration between strong research environments within applied research, method development and infrastructure. The six MCPs are Brain-IT, e-science for prevention and control of cancer, data-driven computational material design, seRC Exascale Simulation Software Initiative, Visual Data Analytics in e-Science Applications and seRC Data Science. The seRC faculty receives approximately SEK 100 million per year in external grants. During 2019, around 40 PIs, a number of computer experts and some 100 doctoral students and postdocs were active within the new MCPs, which has contributed to the scientific production of 200–300 publications with a high citation rate. The 2019 annual meeting took place in Söderköping, with several world-leading international speakers and around 100 Swedish participants. As part of the Swedish e-science school, seRC's universities offered seven third-cycle courses in 2019.

### Science for Life Laboratory, SciLifeLab

With financial support from the Swedish Government amounting to SEK 270 million for national research infrastructure, SciLifeLab assists Sweden's research community in molecular life sciences with advanced technologies and expertise in order to facilitate cutting edge research and be able to answer complex biological and medical questions. An additional SEK 159 million will be provided in strategic research funding directly or indirectly to SciLifeLab's four host universities, KTH, Karolinska Institutet, Stockholm University and Uppsala University, helping to further strengthen the research environment.

SciLifeLab was visited in spring 2019 by its international advisory body, the International Advisory Board (IAB). Prior to the visit, a report was produced regarding developments that have taken place over the last four years. After the visit, SciLifeLab received feedback from IAB containing recommendations for further improving and developing the operation. These two reports, together with a national hearing organised by SciLifeLab in September, form the basis for a new ten-year roadmap that has been drawn up during the year and which is due to be adopted by SciLifeLab's board in early 2020.

During 2019, SciLifeLab conducted a national needs inventory regarding new technologies and activities that could potentially form part of SciLifeLab's future infrastructure. The needs inventory is part of the upcoming international evaluation of SciLifeLab's infrastructure, which will take place in spring 2020.

In 2019, the research infrastructure provided service to academic researchers from all the major universities conducting life science research in Sweden. In addition to the academic projects, the research infrastructure has also provided services to health and medical care and to industry.

In addition to the research infrastructure and its users, SciLifeLab's scientific activities also encompasses research environments that consist of academic researchers working at the host university and affiliated with SciLifeLab. The research infrastructure, its users and the research environment are part of an ecosystem where techniques, technology and knowledge are utilised and developed to facilitate the best research in molecular life sciences in Sweden. The Stockholm hub of SciLifeLab, Campus Solna, is the largest single research environment. In 2019, SciLifeLab's board decided to establish the function of Campus Solna director during 2020. This is a three-year assignment aimed at improving the coordination of the research environment and streamlining and raising the quality of the service provided to the academic researchers at Campus Solna.

During 2019, a further eight team leaders were recruited within SciLifeLab's fellows programme. This programme helps to improve the quality of the research in the field of life sciences, and now comprises a total of 30 excellent young researchers. Of these, three were promoted to associate

professor in 2019. In the long term, the fellows programme aims to ensure that the knowledge level is raised and that Sweden is at the cutting edge internationally.

KTH's activities at SciLifeLab in Solna involve around 280 people who are active within research, education and the operation of the national research infrastructure. KTH's academic researchers are also active within the Research Community Programs (RCPs) and Technology Development Programs (TDPs), which are co-financed with SRA funds and which aim to build networks between researchers at various universities within selected research areas, as well as to develop new, cutting-edge technology for SciLifeLab's technology platforms.

More information about the activities at SciLifeLab can be found in the separate annual report that KTH submits to the Government.

### KTH Digital Futures

KTH Digital Futures is being established in 2020 with government funding amounting to SEK 78 million per year. The aim is to strengthen the strategic research field of IT and mobile communication. As part of the preparatory work prior to the initiative, eight interdisciplinary one-year pilot projects in the field of digitalisation have been launched. This has been made possible by means of funds from the strategic research area ICT TNG and KTH's strategic funds. The research projects cover everything from digital assistants within elderly care and the handling of sensitive personal data, to smart solutions for water distribution and programmable robotics material on a microscale. In total, in the region of 50 research leaders are involved. Following an evaluation of the pilot phase, the projects can be scaled up in order e.g. to hire postdocs and doctoral students.

KTH Digital Futures will also be home to smaller projects, networking, education and inspiration. One important task is to provide the opportunity for researchers to test new ideas in meetings with colleagues across subject boundaries. At KTH Campus, a meeting place measuring 600 m<sup>2</sup> is being completed for research on digitalisation work. Here, KTH Digital Futures will present the work being undertaken through workshops and exhibitions, and it will also be a gathering place for researchers and other actors in the field.

Collaboration with external parties, industry and the public sector got off to a flying start through the Digitalize in Stockholm 2019 conference, which had over 300 visitors, 15 speakers, five panels and 25 demo presentations. This was an initiative arranged jointly by KTH, Ericsson and other partners in order to achieve a wide-ranging dialogue on the effects, drivers and technologies for digitalisation – for society, people and industries. The two days focused on production industry, the future of transport, smart cities and innovations for public services. In conjunction with this, KTH arranged a careers event with 30 female researchers at the end of their third-cycle education, or at the start of their

postdoctoral period. They were invited to Stockholm and KTH within the Future Digileaders programme to participate in the conference.

### Research platforms

The research platforms are related to KTH's strong interdisciplinary and multidisciplinary research areas, and aim to catalyse the coordination of inter-School activities and strategic initiatives within each field of research. There are a total of six active and fully staffed research platforms at KTH: Digitalisation, Energy, Industrial Transformation, Materials, Life Science Technology and Transport.

The Energy platform has arranged a number of seminars, workshops and external events, conducted school visits and had two internal calls aimed at supporting initiatives within energy research at KTH. For the first time, a seminar was arranged in Almedalen on the overall theme of solutions for sustainable energy systems. This year's KTH Energy Dialogue celebrated energy research at KTH and attracted some 300 participants.

The Materials platform has arranged seminars and workshops relevant to materials research, with the aim of promoting KTH researchers' potential to create networks and apply for research funding. The platform is working continually to increase the researchers' use of common infrastructures at KTH, as well as in large-scale national and international infrastructures. Metallic materials were the theme for this year's Materials Platform Day, which was arranged in conjunction with the 200th anniversary of Bergsskolan at KTH. The Digitalisation platform has initiated strategic pilot activities with KTH Live-in Lab and the KTH-MIT collaboration Senseable Stockholm Lab, facilitating and establishing a common environment for data sharing at KTH. The AI@KTH network has been established with more than 80 academic researchers. The platform has supported five conferences and three activities carried out by KTH researchers in the field of digitalisation. The platform participated in several external events and helped KTH to respond to a referral from Region Stockholm, for example.

The Life Science Technology Platform conducted its annual symposium, KTH Life Science Technology Day, on the theme of biological materials. An international workshop aimed at creating collaborations within Horizon 2020 calls was arranged alongside Karolinska Institutet. The platform also participated in the work with the MedTechLabs centre, where two new research programmes were launched during the year: AI in healthcare and bioelectronic medicine.

The newly launched Industrial Transformation Platform aims to visualise existing research, initiate new projects that support the transition of industry with regard to the climate and competitiveness, as well as work at policy level to raise the important issue of industry's transition in Sweden. Three preliminary studies have been initiated focusing on industry:

pharma/bioproduction, electronics and automotive. The task is to analyse what transition each sector needs to make to help achieve the 1.5°C target while maintaining competitiveness. Furthermore, how the new business opportunities that are created can be utilised and how KTH's researchers can contribute to this transition.

In December 2019, the Transport Platform, along with the Industrial Transformation Platform, arranged a joint day on the theme of the transformation of the transport industry and the transport system. The Transport Platform has continued its work within KIC Urban Mobility in 2019, and has supported this financially during the interim phase. KTH is well positioned now that the activity is getting started in earnest.

## European Institute of Innovation and Technology, EIT

KTH is the main partner in five of EIT's total of eight knowledge and innovation communities (KIC). KTH is involved in the fields of ICT (EIT Digital), Energy (EIT InnoEnergy), Materials (EIT Raw Materials), Health (EIT Health) and Transport Systems (EIT Urban Mobility). Digital and InnoEnergy have been running since 2010, while Raw Materials and Health were established in 2015. Urban Mobility is the latest, which was authorised in December 2018 and built up during 2019.

The commitment within EIT is strategically important for KTH and a tool for promoting KTH researchers' networks and collaboration with European research groups and industrial partners. The networks enable an increased capacity for strong EU applications and a higher degree of EU funding for KTH. In addition, EIT offers many opportunities to renew KTH's own core activities in both education and research.

KTH is still one of the largest parties among universities within EIT Digital. KTH's primary commitment is the master's school. KTH was also active in events arranged by EIT Digital during 2019, and participated with students, teachers and researchers in collaboration with both large and small companies.

Within EIT InnoEnergy, the number of innovation projects remains low for KTH's part. However, there are several good examples of start-up companies founded by KTH academic researchers or students who have progressed further in their development and attracted attention both nationally and internationally.

KTH is involved in several projects within EIT Health. Several projects continued within the innovation track, such as POSITIVE in the field of home surveillance systems. New projects have been granted, such as ei4euHealth regarding the application of artificial intelligence in European health care, and IndiRock'nSole, which is being launched in 2020 and focuses on foot ulcers in diabetics.

Within EIT Raw Materials, KTH participated actively in a number of events during the year, as well as hosting some.

Several previously launched projects continued during the year, and new projects were also added. Examples of new projects include LightRight2.0, which e.g. develops training materials regarding lightweight structures, as well as Endureit, which focuses on the development of modified steel with improved durability.

KTH was involved in initiation activities within the newly launched EIT Urban Mobility, as well as joining the Spanish association formally responsible for the activities. KTH is participating in three innovation projects that were authorised during the year, and is also participating in the master's school that is commencing operations in 2020.

## Research infrastructures

KTH is dependent upon access to current and updated research infrastructure to be able to conduct cutting-edge research and education. In recent years, KTH has conducted development work with the goal of ensuring that the research infrastructures that are strategically important for the University's research and education are given long-term conditions. As part of this, KTH has started work on developing a roadmap for research infrastructures for the period 2020–2023.

A number of activities were carried out in 2019 within KTH's research infrastructures. At the start of the year, decisions were taken regarding the internal funds that had been announced in autumn 2018. A total of SEK 20 million was allocated to established research infrastructures, with the aim of renewing equipment/instruments. Criteria and objectives for both established and interim research infrastructure were also followed up during the year, with initial written reporting from each research infrastructure, followed by individual quality-enhancing dialogue meetings between the director of each research infrastructure, the Deputy President and coordinators from the Research Support Office.

Several quality-enhancing meetings were conducted during the year, including meetings for the transfer of knowledge between the various research infrastructures and three workshops for competence development.

In addition, KTH has taken over a human centrifuge and a pressure chamber facility from Karolinska Institutet in 2019. This represents a substantial strengthening of resources for e.g. space centres and the space technology laboratory.

In the Swedish Research Council's call for grants for research infrastructure of national interest in 2019, two grants were awarded where KTH is the principal: National Genomics Infrastructure (NGI) and National Microscopy Infrastructure (NMI). KTH is also a party to a further four national research infrastructures that were granted authorisation, with MyFab and Accelerator-based Ion Technology Centre being particularly worthy of mention. KTH, through NMI, has also committed to coordinating the Swedish

membership of EuroBioImaging-ERIC (European Research Infrastructure Consortium), which has been built up during 2019. This is opening the door to a completely new arena for Swedish researchers within biological and medical imaging, with access to equipment and methods far beyond what is available in Sweden.

## Investment in sustainable production in Södertälje

The research profile for the department's sustainable production development in Södertälje has three different specialisations: production management, industrial reliability and production logistics. At the end of 2019, around 60 people were working at KTH Södertälje. The establishment of the research organisation is in full swing, and by the end of 2019 the organisation has grown to more than 20 people on site: three professors, two adjunct professors, three associate professors, one assistant professor, two postdocs, four employed doctoral students, four externally employed doctoral students and two research engineers/software developers. In addition to these, other KTH-employed researchers and doctoral students also occasionally spend time in Södertälje. The expansion is continuing, with ongoing employment of lecturers, doctoral students, associate professors and postdocs. At the same time, there is close cooperation with Scania and AstraZeneca in respect of taking on a number of externally employed doctoral students.

During 2019, the department has received four new Vinnova-funded research grants and one major EUREKA-funded project. The total research grants in 2019 amount to approximately SEK 30.5 million, of which approximately SEK 15.5 million comprises state grants and SEK 15 million is external funding. In addition, the department is part of Vinnova's Helix competence centre which is running from 2017–2021 and which has its headquarters at Linköping University. In 2019, the department published six scientific articles, nine conference articles, one textbook and three book chapters.

During 2019, the KTH Lean Centre competence centre has conducted the contract courses Lean Production and Lean Leadership, with participants from some 40 organisations.

In the EU project MatLust, the Lean Centre is responsible for the lean programme, where companies receive both knowledge and tools to develop their activities to become more sustainable, efficient, learning and profitable. The LeanForum conference was organised in October in Södertälje, with around 350 participants. The Lean Centre also has regional leadership responsibility in the national Produktionslyftet (production lift) and Robotlyftet (robot lift) programmes.

## Export control

There are two certified export control officers at KTH. They help researchers to examine whether sensitive technology (dual-use items) may be exported in the context of research collaborations.

In the autumn of 2019, the National Inspectorate of Strategic Products made an inspection visit to KTH to examine KTH's procedures regarding the handling of dual-use items. A decision by the authority is expected in spring 2020.

## Honorary doctorates

In June, the Faculty Council awarded three honorary doctorates on the following stated grounds:

**Professor Tamer Başar** at the Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, USA. Tamer Başar is a world-leading researcher in dynamic game theory and robust control technology, who has made many important contributions within basic theories and their applications in communications networks, electrical power systems and cyber-security. He is a true research leader and visionary, particularly with regard to security-critical systems and the vulnerabilities of information technology. Through a number of significant collaborations, Tamer Başar has promoted KTH's activities within control technology, game theory, cyber-physical systems and related areas within information and communication technology. He has been a great support to the Linnaeus Center ACCESS at KTH, by encouraging the development of the cyber-security field and through several scientific collaborations with KTH researchers. Tamer Başar has been a driving force in the INSPIRE strategic partnership programme between the University of Illinois at Urbana-Champaign and KTH.

**Professor Richard Florida** at the Martin Prosperity Institute, Rotman School of Management, University of Toronto, Canada. Richard Florida is one of the world's leading researchers and debaters in the field of urban development and renewal. He has been collaborating with urban researchers at KTH for fifteen years, and has contributed in the establishment of research centres, conferences, lecture series and publications. Richard Florida's 2002 book, *The Rise of the Creative Class*, and his subsequent development of theory and data on the importance of the 'creative class' for positive urban development, have had an enormous impact at policy level and as a starting point in market analyses for cities around the world. At the same time, this significant impact has been the subject of debate and has been criticised on the basis of possible links to growing social divides in cities, which, from a creative class perspective, can be described as demonstrating a positive trend. Florida

himself highlights the problem of increased segregation and inequality in its 2017 book, *The New Urban Crisis*.

**Dr. Cecilia Schelin Seidegård**, former Chairman of the Board of KTH and former Governor of Gotland County. Throughout her professional life, Cecilia Schelin Seidegård has demonstrated a high level of commitment in the higher education sector. This, combined with her considerable efforts in respect of two important issues for the future – gender equality and sustainability – has resulted in her making a very positive impression in the higher education world and in particular at KTH. From 2004–2010, Cecilia Schelin Seide-

gård was the Chairman of the Board of KTH, and during this time contributed to the university's positive development. Her commitment to education and research has continued and she is now Chairman of the Board of the University of Gothenburg. Among her many other directorships, Schelin Seidegård has decided in 2019 to become involved in Stockholm Science City and Studentbostäder i Sverige AB, also assuming the role of chairman for both of these. In addition to this, she is also involved as a member of the advisory councils for both the Public Health Agency of Sweden and the Swedish Environmental Protection Agency.

# Collaboration

The aim of long-term investments in strategic collaboration is that the efforts should contribute to higher quality and relevance in education and research. KTH is working to establish and develop a systematic approach to collaboration via central support functions consisting of expertise in alumni relations, strategic partnerships and collaboration with small and medium-sized companies and regional parties.

## Strategic partnerships

KTH has extensive experience of cooperating with companies, research institutes, state authorities, municipalities and county councils. Since 2011, KTH has worked on establishing strategic partnerships with companies and organisations. Strategic partnerships now exist with ABB, Bombardier, Ericsson, SAAB, Sandvik, Scania, Skanska, Region Stockholm, City of Stockholm, Stora Enso and Vattenfall. In 2019, the IVL Swedish Environmental Research Institute and the Stockholm Environment Institute were added as strategic partners.

Each partnership is followed up annually by KTH's senior management alongside the senior management of the partner in question. This work is led by the Deputy President. The steering groups include academics who are partner managers as well as relevant area representatives. Joint operational support assists with partner managers for each partnership.

## Personal mobility

An essential part of KTH's strategic collaborations consists of personal mobility between academia and other organisations – both companies and public administration. KTH offers several variants of personal mobility in to KTH: adjunct professor, affiliated faculty member and affiliated professor, externally employed doctoral student, as well as an industrial licentiate (Professional Licentiate of Engineering, PLEng). In addition to this, KTH is working actively to increase personal mobility out of KTH. KTH has allocated special funds to encourage personal mobility out of KTH to strategic partner companies, other companies and municipalities. The Schools must report on how these funds have been used and how gender equality aspects have been taken into consideration in accordance with the submitted plans. KTH is also working to develop collaborative skills as a qualification in conjunction with employment and promotion, which is a prerequisite in order for personal mobility to be viewed as an attractive choice in a person's career.

## Work to increase the impact of KTH's research and education in society at large

The work of increasing the societal impact of KTH's research and education has continued during the year. The work

relating to impact was previously financed externally, but KTH has taken over this funding since 2018. The work includes creating the preconditions for increased societal impact, capturing effects and disseminating information about the results. Impact managers at KTH's Schools have integrated the impact perspective into the core activities. The operational support coordinates this work, supported by a project group. Impact managers have held regular meetings to ensure an exchange of experiences and common learning, which has contributed to increased awareness of societal impact and possible ways of achieving increased societal impact.

## Development projects related to strategic collaboration

In 2017, Vinnova launched the programme "Development of the universities' collaborative capacity for development projects on strategic collaboration". In total, some SEK 120 million is being activated with this programme up to the end of 2020. A portfolio of 17 university-wide joint development projects commenced at the end of 2017. KTH is leading one of these projects, MerUt - Methods for Relevance Assessment of Courses, in which Stockholm University, Umeå University, Linköping University, Karolinska Institutet, Mälardalen University and Kristianstad University are all involved. KTH is also participating in a further eight projects. More information about the 17 development projects can be found at [k3projekten.se](http://k3projekten.se).

## Collaboration with society at large

KTH's strategy for collaboration with small and medium-sized enterprises (SME) means that KTH makes contact with small and medium-sized companies and contributes knowledge to help meet the companies' challenges and needs related to development.

In the EU's Structural Funds partnership, there is particular emphasis on cooperation with SMEs, with the fund being focused on projects that work for growth and employment in Sweden. For example, the funds can be used to create strong research and innovation environments, promote increased entrepreneurship and develop enterprise and growth. Good relations and collaborations with SMEs are required for continued success in obtaining research funding in European competition.

The EU project Grön Bostad Stockholm (Green Housing Stockholm) is in its final year. The aim is to strengthen the collaborative structures within housing construction in the Stockholm region, at the same time as creating better conditions and opportunities for SMEs to enter into these collaborations with innovative and environmentally friendly products and services. Grön BoStad Stockholm is a collaborative project that contributes to sustainable urban development, reduced segregation and the transition to a low-carbon economy.

Digital Demo Stockholm has continued to develop during the year. Digital Demo Stockholm is a collaboration involving KTH along with Stockholm University, the City of Stockholm and Region Stockholm, as well as Ericsson, ABB, Skanska and Telia. The purpose of Digital Demo Stockholm is to create the conditions for an innovative market that can contribute to regional development that is both sustainable in the long term as well as scalable. Agenda 2030's global goals form the basis for the future work within Digital Demo Stockholm. The global goals are integrated with the three dimensions of sustainable development: economic, social and environmental. The following areas are prioritised: the communications and logistics systems of the future, health and social care, as well as climate and the environment. KTH researchers and doctoral students are involved in several of these projects.

OpenLab is a challenge-driven innovation environment for collaboration between the City of Stockholm, Region Stockholm, the County Administrative Board of Stockholm County, KI, SU, Södertörn University and KTH. The core of the activities is interdisciplinary and multidisciplinary second-cycle courses as part of a collaboration between the participating universities and other institutions of higher education. In addition, OpenLab conducts workshops and other activities where different parties meet, under new forms and ways, in order to develop proposals to deal with the challenges facing the region.

The project Frontrunners for Sustainable Innovation is in its second year, with collaborations taking place along with the test and demo environments OpenLab, Kista Science City, Urban ICT Arena and Södertälje Science Park. The project focuses on KTH's research and education, together with SMEs, contributing to solutions to societal challenges through digitalisation, life sciences and environmental and climate technology. The project addresses sustainability issues in line with Stockholm's objective of being a smart sustainable and connected world-class city in 2040.

KTH is providing a digital platform, KTH Degree Project Portal, to make it possible for KTH's students and employers to make contact with each other. Here, companies, organisations, institutes and institutions can publish proposals free of charge relating to degree projects, project assignments, trainee positions and internships. Over the course of 2019, more than 1,300 student assignments have been entered into the portal, of which approximately 800 were related to degree projects.

### Lifelong learning and contract education

During 2019, the work continued on developing how KTH will contribute to the labour market's skills requirements within KTH's areas of strength. The degree of collaboration for KTH's teachers will increase in order to provide increased quality and relevance in KTH's regular education.

KTH is currently an active player in the training of professionals through contract education, for example in the fields

of radio systems technology, electrification of heavy vehicles and real estate economics. In 2019, KTH received a three-year assignment from Vinnova to develop a comprehensive training package for professionals in "Materials in a circular society".

In collaboration with six other universities, KTH has a government assignment to continue to implement skills development initiatives within artificial intelligence, AI. Chalmers coordinates the initiative and reports back to the government in a special order. KTH, via KTH Executive School AB, has continued the development and implementation of AI-education for companies and organisations during the year. For example, the series of seminars "AI – Under the Hood of Machine Learning" was developed during the year, with the aim of building up a fundamental understanding of AI. The programme has been conducted in two phases and is also being developed in an online format to enable greater distribution.

In the spring of 2019, work was carried out to investigate the conditions for an increased volume of contract education in the first instance. KTH was active in a joint working group comprising trade unions, employers' organisations and universities regarding the conditions for strengthening lifelong learning at Swedish universities. During the autumn, the Vice President for Education appointed a working group to propose measures for developing the field of lifelong learning at KTH. The goal is for KTH to be a leading player within lifelong learning, and thereby to support Swedish companies and organisations in respect of safeguarding their global competitiveness. In this way, KTH can further contribute to the long-term attractiveness to companies of the Stockholm region and the country as a whole.

As part of the development work, KTH is maintaining a dialogue with its strategic partners and several other companies and organisations in order jointly to develop training for professionals.

### Alumni relationships and KTH Opportunities

KTH Alumni's mission is to care for and develop good relationships with KTH's alumni. The focus continues to be to increase long-term commitment by offering relevant activities and good opportunities for networking. In spring 2019, thirty-five applications for financial support were received by the Opportunities Fund. Just over a third – 12 projects – were granted all or part of the amount applied for. In addition, several new initiatives were launched to aid the Opportunities Fund during the year, including Giving Tuesday and a digital campaign during the fourth quarter. Among alumni living abroad, interest in becoming involved as a mentor for students travelling to study abroad, as part of the International Buddy Programme, has remained strong. During the year, some eighty meetings, events and networking meetings were held in cities such as Stockholm, Zurich, London,



Jakarta, Singapore, Tokyo and Boston. The inspirational lecture “Alumnus of the year” was a popular event that attracted many people this year as well.

## Fundraising

KTH’s fundraising activities comprise strategic, structured and long-term work to increase private external funding to KTH. The activities should be viewed as a complement to traditional financing. The larger funders with a multi-year commitment include the Erling-Persson Family Foundation, the Birthe & Per Arwidsson Foundation, the Axel and Margaret Ax:son Johnson Foundation and companies such as Scania, Ericsson, Brummer & Partners and Einar Mattsson.

KTH’s fundraising work is a focused effort aimed at increasing the involvement and support for KTH from industry and society in existing and new networks. A complementary and very important part of the work is to arrange various types of seminars that increase the awareness of KTH’s activities and strengthen relations with society at large.

## Innovation Office

In the Government research bill for 2008, KTH was one of the parties appointed to launch what is referred to as an innovation office. The work within the innovation office is led by the department KTH Innovation within Joint Operational Support (JOS).

Since its inception, KTH has worked very closely with universities and other institutions of higher education in the region. These collaborations have been extended over the years and, since 2016, KTH has been allocated funds to provide services to universities in the region, in particular Mälardalen University, the Stockholm School of Economics and the Swedish School of Sport and Health Sciences. Another university, Södertörn University, was added in 2019 and will receive a separate part of these services. KTH has collaborative agreements with these universities regarding the provision of services for innovation development and the transfer of funds, in order to build up basic collaborative skills and in-house innovation support at each university. Innovation development services include support and advice regarding activities development, financing, patents and recruitment. Each of the four universities, together with KTH, has produced an action plan for activities and initiatives aimed at strengthening the innovation support locally. At the same time, KTH has opened up its innovation support activities to individual academic researchers and students at the four universities. Since the establishment of the innovation office at KTH, it has worked closely with Uppsala University within patent support and participated actively in other exchanges of experiences with other innovation offices.

During 2019, the focus has been on supporting value-creating initiatives on site at the various universities, with the aim

of ensuring that all researchers, students and employees are aware that they can receive support locally and through the Innovation Office at KTH.

During 2019, KTH Innovation has worked to create a model for how KTH can connect to the needs of the major Swedish industrial companies in a more efficient and structured manner. A pilot project has been initiated with one company. The Brighter Startup internationalisation programme was conducted for the seventh year in a row, this time in Boston, New York and Munich. Brighter Startup is a tailored development programme for idea carriers with business ideas that are deemed to have global potential. The programme is open to idea carriers from all parties within the Innovation Office, in part with the aim of increasing the participants’ knowledge of entrepreneurship in an international context. During 2019, KTH Innovation has investigated the conditions for further extending the Brighter programme to Tokyo, in order to establish the programme in Asia.

## Activities supporting innovation

KTH Innovation works to ensure that research results and activities ideas from academic researchers and students at KTH will evolve and meet the market. The overall objectives of KTH Innovation are to:

- increase the number of ideas and results from KTH’s academic researchers and students who meet the market and become successful innovations
- ensure an effective support process in an international perspective (with the proper network and prerequisites) in order to best support the path of ideas to the market
- further develop a strong, complementary ecosystem for innovation support at KTH that is of international top class

During 2019, KTH Innovation has worked through its values and updated its core values to reflect more closely the university’s goals and strategies. KTH’s four prioritised areas – sustainable development, internationalisation, gender equality and digitalisation – permeate KTH Innovation’s activities in a tangible and forward-looking way.

During 2019, KTH Innovation has run a project aimed at identifying how ideas in the innovation support process relate to the UN’s sustainable development goals. The aim is to increase the number of ideas that make a positive contribution to sustainable development. One activity within the project is to allow idea carriers to map their ideas against the UN’s goals as a way of identifying their climate impact and making early choices that lead to a more sustainable business model. KTH Innovation is also involved in a number of collaborative initiatives relating to sustainable development in the field of higher education, such as the Vinnova-funded Agera project, which deals with collaborations for Agenda 2030.

The annual Global Change Award, initiated by the non-profit H&M Foundation, aims to protect our planet and living conditions by accelerating the shift from a linear to a circular

fashion industry. In addition to a financial grant, the winners get to participate in a year-long accelerator programme that speeds up developments and maximises the impact on the industry. KTH is a partner in the accelerator programme and KTH Innovation contributes with a week-long bootcamp in Stockholm.

During the year, KTH Innovation has been involved in the collaboration within the municipality and region. KTH has held several meetings with the Deputy Regional Council. Representatives for the region have also conducted a number of visits to the operations at KTH.

During 2019, KTH Innovation has continued its work aimed at increasing the number of women who are developing their ideas. Gender equality aspects have been introduced in the activities plan and are monitored on an ongoing basis, such as setting targets and following up both the number of new ideas from women as well as the number of women who are active in the innovation support process. The share of new ideas from women has increased from 25 percent to 30 percent since 2018, and the number of women active in innovation development has increased from 73 to 104.

KTH Innovation possesses expertise in process-oriented innovation development. There has been considerable interest from the outside world during the year, and licence agreements have been entered into with both Swedish and international companies, universities and innovation offices, including with

a highly ranked university in the UK. In addition, there has been a dialogue with one of the USA's leading universities. The licence relates to the use of the tool KTH Innovation Readiness Level™ through the website built up by KTH Innovation. The site describes the tool and how it can be integrated into innovation development at other innovation offices.

In 2016, the entrepreneur Bicky Chakraborty donated SEK 5 million to KTH for the purpose of strengthening the entrepreneurial mindset of students and academic researchers at the University. In 2019, a third round of participants has undergone the Bicky Chakraborty Entrepreneur Programme, including funding, coaching, tailored courses and mentoring.

KTH Innovation has received 373 new ideas in 2019, of which around one-third are from academic researchers and two-thirds from students. The commercialisation projects supported by KTH Innovation have attracted a total of SEK 31 million in funding, including from the Vinnova-funded programme "Validation for application" (VFT), which is managed by KTH Holding AB. 31 companies have been formed during the year, of which 18 were student companies, and 19 patent applications have been submitted. During the year, six companies have been admitted to the business incubator STING and one to other Swedish and international incubators. 28 projects were approved for the pre-incubation programme at KTH Innovation.

# Quality work

## KTH's quality work within education, research and collaboration

KTH's systematic quality work is based on KTH's quality assurance policy. The quality assurance policy is based on KTH's Development Plan for 2018–2023, as well as the quality requirements set out in the Higher Education Act, the Higher Education Ordinance and European standards and guidelines for the quality assurance of higher education.

In KTH's quality work, it is extremely important for students, teachers and other personnel to be included and involved. At the same time, there is a clear formal division of responsibilities and joint operational support for the quality assurance work.

The Faculty Council, under the direction of the Dean, is the collegial body that has the overall responsibility for quality in education, research and joint collaborations. At each School, there is a member of the faculty with responsibility for the first-cycle and second-cycle educational programmes, named the Director of First and Second Cycle Education (GA), and member of the faculty with responsibility for third-cycle studies, named the Director of Third Cycle Education (FA). Each educational programme has a Programme Director (PA). Quality assurance work is included as a natural part of each position.

In 2019, the Swedish Higher Education Authority (UKÄ) reviewed KTH's quality assurance work. This means that KTH's quality system as such, as well as the development of the system and the ongoing operational work in terms of safeguarding and developing high quality in all education, including collaborations, gender equality and student influence, are reviewed by UKÄ. UKÄ's review has resulted in a lot of work in 2019 focusing on developing a self-evaluation of KTH's quality assurance work, as well as preparing and making arrangements for the two site visits carried out by UKÄ's assessment group.

## The role of the Faculty Council in the quality assurance work

The Faculty Council has an advisory role vis-à-vis the President, and it has overall responsibility for the quality assurance of KTH's education, research and joint collaborations. This means that the Faculty Council is responsible for developing KTH's quality system and for leading KTH's strategic quality work. The Council also has the overall responsibility for the collegial foundation of quality assurance. The role has changed during the year, as a result of the responsibility for quality assurance in connection with the recruitment and promotion of teaching staff having been moved to the appointments board. A new Faculty Council, including the Dean and Vice Dean, has been elected during the year for the period July 2019 to June 2023.

During the spring, the Faculty Council has contributed to the work on KTH's self-evaluation, which is one of the

foundations for UKÄ's review. A selection of Faculty Council's members have also participated in interviews during UKÄ's site visits.

Through the Dean, the Faculty Council has been involved in the continual monitoring, including quality dialogues with the management, of all of KTH's Schools, and has followed up the Schools' quality work within education, research, skills provision and collaboration.

## Student influence and Student Union's role in quality assurance work

THS continues to have the status of the student union for the whole of KTH.

KTH has long worked alongside THS, in part to ensure that KTH's students are represented in all decision-making bodies and in virtually all preparatory groups and working groups. In KTH's experience, THS chooses students who represent different parts of KTH and who, as far as possible, also reflect social, ethnic and cultural diversity.

In 2019, THS been involved in the work on KTH's self-evaluation, although it has also compiled its own student submission that constitutes a foundation for UKÄ's review.

## Development of KTH's quality assurance system

KTH's quality assurance system, when fully developed, will consist of continual, annual follow-ups and regular audits every six years. The continual follow-up, which includes a quality dialogue with all five of KTH's Schools, has been carried out in 2017, 2018 and 2019.

The development of the continual follow-up in 2019 has principally related to following up of research, where a template has been developed for following up research at both departmental level and School level. Other development work has related to the following up of skills provision and providing feedback to the Schools regarding the follow-up.

The regular review of education will be planned and led by the each School at KTH. The Schools have commenced this planning in 2019, and a workshop has been conducted during the spring to discuss the work. Central support needs to be developed for the Schools in the form of guidance regarding the recruitment, appointment and remuneration of experts. Support is also needed in the form of standardised templates for the supporting data that will be included in the audit, as well as the reports that will result from the audit. The work on central support is planned to be completed during spring 2020. At the same time, the Schools have taken the initiative and launched a discussion regarding streamlining through coordination of the audit of their courses and study programmes.

The development of the regular audit of research has been the focus of particular attention in 2019. Planning has

commenced regarding KTH's next regular audit of research (RAE), which will be carried out in 2020.

## Quality assurance work within education

In connection with the continual following up of all education, the Dean, together with the Vice President for Research and the Vice President for Education, conducted quality dialogues with each School. During the dialogues, the results of programme analyses and School reports were discussed with the School management, the Director of First and Second Cycle Education and the Director of Third Cycle Education, as well as a student representative. The analyses show that much is working well, although also that there are problems and challenges that the educational programme must continue to work on. One highlighted area of development relates to ensuring that course evaluations and course analyses are carried out on courses at all levels. There is also a need to develop support in order to provide information more easily for the work of following up and safeguarding the results of the education.

A review of the process for admission to doctoral studies has led to more frequent advertising of vacancies, from five times a year to nine times a year. Furthermore, some administrative procedures have been improved, and decisions in respect of requirements as regards knowledge of English equivalent to English 6/B will enter into force from 1 January 2020.

A major review of all governing documents relating to third-cycle education has been carried out, and has led e.g. to more than 20 separate governing documents being revised and merged into a single governing document that covers virtually all parts of the education.

## UKÄ's reviews and evaluations

At the beginning of 2019, UKÄ launched the third round of reviews of the universities' quality assurance work, which includes KTH. A number of key functions at KTH have contributed to the work of developing texts for the self-evaluation, which have subsequently been compiled into a uniform document based on UKÄ's guidance. During the autumn, UKÄ's assessment group has conducted two site visits, one lasting one day and the other lasting three days, in order to increase their insight into and understanding of KTH's quality assurance work. After the first site visit, the assessment group has opted to look in greater depth at KTH's systematic work in respect of continual following-up, as well as the quality assurance in the establishment and discontinuation of courses and study programmes. UKÄ's report is expected to be issued by the end of March 2020.

The results of the educational evaluations that UKÄ launched in 2018 have been reported during 2019. The third-cycle education in the field of industrial production was judged to be of high quality, while the third-cycle education in art, technology and design was judged to be lacking in

quality. The programme management for the third-cycle education in art, technology and design has highlighted shortcomings in UKÄ's assessment process, which has resulted in KTH having requested a review of the evaluation of the education. UKÄ's review board has agreed with the criticism and granted a review. UKÄ has appointed an expert and launched the work in autumn 2019.

During the year, UKÄ has followed up the third-cycle education in economics, which was deemed to be lacking in quality in the evaluation of the education carried out in 2017. In the follow-up, UKÄ considered that the implemented measures ensure a high level of quality in third-cycle education in economics.

## Higher education development

The introduction of target-related grading criteria has received special support in 2019. At the same time, work has been carried out to develop the online course analysis system. The work of developing a template for the course memo has started, and an implementation group and a reference group have been appointed for the higher education excellence programme. Work has been initiated to develop an online course regarding rules, procedures and processes for education at KTH. The course is designed so that it can serve as a compulsory course for examiners for all educational levels. Furthermore, a shared position as an educational developer has been established at the Department of Learning, in the ITM School, and at the Equality Office, in order to extend the educational support in the JML work.

## Survey follow-ups of students and doctoral students

KTH conducts regular surveys of students and doctoral students, in the form of initial surveys, interim surveys, career surveys and doctoral student follow-ups. The questionnaires are part of KTH's systematic quality assurance work, and the fact that they are conducted regularly provides the opportunity to monitor developments over time. The results can be analysed for the entire population as well as for programmes individually, broken down by gender, Swedish citizens/non-Swedish citizens, and parents' educational background, and presented in tables (overall, programme type, individual programme and School) as well as in a comprehensive overall report. The results can therefore be used in the quality assurance work at various levels in the organisation and in the work on the gender mainstreaming mandate. These questionnaires are followed up in collaboration with Statistics Sweden (SCB).

Work has continued in 2019 on improving the dissemination and the use of the results of the surveys. The clearer role of the questionnaires in systematic quality assurance work strengthens the dissemination and use of results. A working group for doctoral student follow-ups has been established in 2019. The working group is reviewing the battery of questions prior to the implementation of the 2020 survey.

The purpose of the working group is also to ensure that the questionnaire is more firmly anchored and adapted to the needs of the recipients of the results.

KTH has conducted the interim survey in 2019, which monitors existing students in the middle of their education. A new feature for 2019 is that students on the Master's programmes were also followed up via a customised version of the interim survey. The purpose of the interim survey is to highlight how KTH's students perceive their study environment, their education and their study situation. The survey covers areas such as the students' background, how they view their education and perceive their teachers, the students' motivation to study and their study effort, their ability/interest as regards identifying with their study programme and university, the students' health and the occurrence of victimisation.

The survey shows that the majority of students feel they are happy at KTH, that their teachers' subject knowledge is very good and that they are receiving a high-quality education. The majority would choose the same education again and recommend their education. Men are satisfied to a greater degree and are slightly happier than women at KTH. This may be due to the fact that men feel a greater sense of affinity with the environments at KTH than women. In the case of students whose mother tongue is not Swedish, there is a greater sense of not exactly fitting in. KTH's students feel good, generally speaking, but the survey indicates increased feelings of stress and anxiety. Some students, principally women and students whose mother tongue is not Swedish, report that they have been subjected to victimisation. These are important issues that KTH is continuing to work on.

### Quality assurance work within research

The quality assurance work within research is an integral part of activities, and is covered by both continual following up and regular reviews. The continual follow-up of research has been developed in 2019. KTH's departments have followed up and analysed data regarding publication and funding, and have reflected on the research environment. In the analyses, aspects regarding gender equality and sustainable development are integral parts. Using these analyses as a basis, each School has performed a follow-up and summary analysis of the research at the School. The School's analysis formed the basis for KTH's continual following-up and quality dialogue.

A regular review of KTH's research (RAE) will be carried out in 2020. The review has been planned by a steering group for quality assurance of research during 2019. The steering group has been led by the Dean and Vice President for Research. During the year, a project team has been appointed to work with practical implementation aspects, under the Vice President for Research. During the autumn, the project team has worked to develop a guide for the self-evaluation

work, commenced the recruitment of experts and planned the expert panels' visit to KTH in August 2020.

### Quality assurance work within skills provision

During the year, work has continued on the development of the Schools' plans for faculty development and skills provision. The aim is to carry out strategic planning of KTH's skills provision in respect of teachers and academic researchers, as well as to deal with a number of aspects such as recruitment, promotion, development and gender equality.

A new element for 2019 is that quantitative personnel data has been drawn up centrally in order for the documentation to be consistent for all Schools and comparable over time at an aggregated level. The skills provision plans have been updated to provide greater scope for analysis and reflection. New issues have been added, such as following up implemented performance appraisals, the number of teachers with higher education teaching qualifications as well as leadership training.

A self-evaluation of the process when recruiting teaching staff has been compiled, and has formed part of KTH's documentation in UKÄ's review of KTH's quality assurance work. This part of the self-evaluation related to how the university will ensure that the skills of the teaching staff correspond to the needs of the courses and study programmes.

During the quality dialogues, needs have been identified within a number of aspects of skills provision. For example, the central programmes for academic career support and skills development within leadership and gender equality are extremely important for KTH's skills provision. The coherent organisation of these programmes needs to be reviewed and the continuity of operations ensured. Furthermore, there is still a need for efforts to achieve greater gender equality during recruitment and in order to retain female teachers.

Within educational skills development, the range of higher education teaching training courses has continued to develop. First-cycle courses are made available in ways that are adapted to the teachers' working conditions. The range of higher education teaching training courses needs to continue being developed, with a focus on gender equality, equal opportunities and accessibility. The courses will be offered to all teaching staff, regardless of their position.

KTH offers higher education teaching training courses to teachers engaged in teaching, academic researchers and doctoral students at KTH. In 2019, both foundation courses and advanced courses were given in the field of higher education teaching with a total of 324 registered participants, of whom 112 were women and 212 were men. The courses follow current research in the field, the needs of the teachers and the educational programmes, as well as SUHF's recommendations (SUHF rec. 2018:1). An internal conference has been arranged during the year in the field of higher education teaching. The conference focuses on higher education

teaching with a scientific connection to learning within higher education, and is conducted every two years. Furthermore, collegial networking meetings for KTH's directors of studies and programme managers have been conducted regularly. As a collegial gathering place, large group meetings have been arranged once per term for course and study programme directors, teachers and students, as well as other interested staff.

Two new higher education teacher training courses have been conducted for the first time in 2019: Gender and gender equality in technical higher education, 4.5 credits, and Learning for challenge-driven education with global development goals, 3 credits.

### Quality assurance work within collaborations

Working life perspectives and collaborative aspects have been integrated into the templates that govern the content of the documentation for the continual following-up of education. In this continual following-up, KTH works on the basis of the assessment areas and assessment criteria that UKÄ has developed for the evaluation of education. This prepares the courses and study programmes for the regular reviews that they will be subjected to every six years.

The 13 established strategic partnerships constitute an important part of KTH's systematic quality work within collaborations. KTH collaborates with strategic partners to enhance relevance and quality in education and research. The partnerships contribute to increased contact between education, research and society (see more under the section Collaboration). Regular meetings have been conducted with the partner managers and partner leaders within KTH who are involved in the quality development partnerships. The partnerships have been followed up in the annual management dialogues.

Within the collaborations and the strategic partnerships, personal mobility is a prioritised area. In order to maintain a dialogue with adjunct professors and affiliated faculty, the Forum for Adjunct Faculty is held on a regular basis. This forum is used as part of KTH's quality development work within collaborations.

In the field of collaborations, KTH has continued the work of developing and strengthening Societal Impact, i.e. sectoral and social impact, during 2019. The role of impact manager at KTH's Schools is at the heart of this work. Active work on Societal Impact is still included as part of the Schools' assignments. The work has been supported by a project group with representatives from joint operational support, with a unifying coordinator. Eight joint meetings with impact managers have been held during the year. These meetings involve an exchange of experiences and learning for the further development of KTH's societal impact. Prioritised activities linked to previously developed school-specific strategies have been implemented at Schools.

KTH has continued to be the convener and coordinator for the national management network regarding strategic collaboration, KLOSSnet (Knowledge exchange and learning about strategic collaboration). KLOSSnet entails opportunities for capacity building and quality assurance work in the field of collaborations.

During the year, KTH has been active in the portfolio of national operational development projects within the field of collaborations that are supported by Vinnova, known as the K3 projects. Several projects in which KTH participates have a direct bearing on quality development, such as the project "Collaboratively integrated quality system for increased utilisation" (SKÖN), which is led by Linköping University. KTH is leading the project "Methods for Relevance Assessment of Courses" (MerUt), which aims to develop the collaborative perspective in quality assurance systems. Another project that is related to KTH's quality work is "Merit value of collaborative skills" (MerSam).

Via its alumni, KTH receives regular support and feedback to its operations. They also contribute with a national network as well as a growing international network. In order to strengthen and develop the relationship with KTH's alumni, efforts have been initiated which aim to increase understanding of how alumni want to become involved and contribute to KTH's educational programmes and research.

### Rankings

Ranking measures excellence in research, education and joint collaborations, and can be seen as a measurement of the value of a university's international competitiveness. The importance of visibility and placement on ranking lists for areas such as student recruitment, recruitment of international academic researchers, international collaborations, grant opportunities and influence on various policies, investments in excellence and expressions of national prestige, has increased in recent years. Several advocates of rankings, including the European Commission, see rankings as an incentive to increase the quality of research and higher education.

KTH generally performed well in 2019. In the QS World University Rankings, KTH moved up from 104 to 98. KTH's international reputation, both among employers and academics, still remains strong in the QS poll. In the Times Higher Education (THE) World University Rankings, however, KTH moved down from position 187 to the range 201-250. KTH has mainly lost ground in terms of the citation rate and overall reputation. At the same time, other universities have advanced their positions and the level of international competition is expected to increase.

KTH was ranked as high as number seven in the world in the THE University Impact Rankings, which are targeted at the UN's 17 global sustainability goals. KTH performed particularly well in Goal 8 Decent work and economic

growth, where it was ranked number two, Goal 9 Sustainable industry, innovation and infrastructure, where it was ranked number three, and Goal 13 Climate action, ranked number nine. The ranking was based on extensive documentation of texts related to the sustainability goals, above all taken from KTH's website, as well as bibliometrics and other quantitative data.

KTH has continued to perform comparatively well in subject area and subject rankings. In THE's subject area ranking for engineering and technology, KTH was ranked as the 62nd best university in the world. However, this is a fall of nine places since 2018. The decline can be attributed primarily to impaired rankings in terms of reputation and citations. In QS's corresponding ranking, the university was ranked the 36th best, which is an improvement of five places. In QS's subject rankings, KTH is represented with 15 subjects, eight of which are among the top 50. Electrical engineering was the highest ranked, in 19th place, followed by architecture in 23rd place.

KTH's foremost strength in terms of rankings is the very high production of publications per teacher and researcher. In addition, there is a very high proportion of co-publication with researchers from international universities and with the business community. KTH is successful in obtaining research funding from external funders, is performing relatively well in reputation measurements and is still performing better than other Nordic universities of technology in QS. KTH also has a high proportion of international researchers, teachers and students, which is important in a rankings context.

KTH's reputation is stronger than the university's performance in the bibliometric indicators. One weakness is the values in indicators that measure the impact and excellence of the research. This is illustrated by the relatively low normative citation rate. KTH is ranked only at 471 according to the THE World University Rankings, and is also demonstrating a downward trend. KTH has relatively few highly-cited researchers, and only just over half of KTH's departments are cited above the world average.

# Environment and sustainable development

KTH's ambition is to be a leading university of technology in the fields of environment and sustainable development, and to have an identity and a brand associated with these issues. As a university of technology, KTH has a key role in influencing the development of society in a positive direction in order to contribute to the UN's global goals. This is achieved by educating, researching and collaborating with the surrounding society and by reducing the environmental impact of the university's own activities.

KTH's educational programmes provide the next generation of leaders with the knowledge and skills needed to address current and future challenges. In order to contribute to a sustainable society, it is important for the research to reach out and be put into practice. KTH therefore attaches great importance to joint collaborations with various societal actors and to making new research results visible.

KTH's strategic work on the environment and sustainable development is based on KTH's overall sustainability goals for 2016–2020 and the policy for sustainable development. The sustainability work must be integrated into the regular operations at KTH's Schools and within the joint operational support. To support the long-term work of integrating sustainable development into the operations, strategic work is conducted centrally within the KTH Sustainability Office.

KTH has a Vice President with responsibility for sustainable development. The Sustainability Manager is responsible for the environmental and sustainability work carried out within the framework of the KTH Sustainability Office. The KTH Sustainability Office is tasked with supporting the work aimed at achieving KTH's sustainability goals, participating in national and international meetings and networks, as well as maintaining and developing KTH's certified environmental management system.

An academic reference group supports the Vice President for Sustainable Development as well as the Schools in the work relating to the integration of sustainability. This group includes representatives from the schools, the Faculty Council, THS and the KTH Sustainability Office.

In 2019, the Times Higher Education ranking institute performed a ranking of impact for the first time, based on the global sustainability goals. KTH participated and did very well. KTH came in 7th place worldwide, which also made it the highest ranked technical university in the world. See the *Quality Work* section.

## Environmental management system

Since August 2015, KTH's environmental management system has been certified according to the international environmental management standard ISO 14001 and complies with the requirements in the Ordinance (2009:907) on

Environmental Management in Government Agencies. As of 2019, all the Schools and the joint operational support have central support via the KTH Sustainability Office in order to maintain and develop the environmental management system.

During 2019, work has been carried out to ensure that the environmental management system will be integrated to a greater extent in KTH's operational planning. Responsible roles and functions within the sustainability work have been identified and training requirements for these have been discussed.

The environmental management system has been coordinated with the quality system for education. KTH has strengthened the work relating to observing the law by coordinating the work centrally to a greater extent and by providing support to the Schools in their work on compliance with regulations and other requirements in the environmental field.

KTH has overall sustainability goals, on the basis of which the Schools and the joint operational support have to work. Each goal has a joint action programme with activities to achieve the goals. The overall sustainability goals 2016-2020 comprise ten areas:

- education
- research
- collaborations
- working environment (not followed up within the environmental management system)
- KTH's campuses (energy, new construction and renovation, the outdoor environment, transport, waste)
- travel
- procurement and purchasing
- the handling of chemicals
- investments of foundation capital and donated capital
- organisation and management

## Staff training

Various forms of environmental and sustainability training have been conducted in 2019, for example within the framework of the introduction of new employees and KTH's managerial and leadership training. Staff training in sustainability has been carried out for employees working with service issues within joint operational support.

In order to support the work to integrate sustainable development into the operation, workshops on the topic have been conducted at the Schools, aimed at teaching staff, various groups at joint operational support (JOS) and for new student ambassadors.

During the year, the higher education teacher training course, "Learning for Challenge-Driven Education with



Global Development Goals”, was offered for the first time. This can be viewed as a continuation of the course “Learning for Sustainable Development”, which has been given annually for many years. Sustainable development is also integrated into several other educational courses. In “Basic Communication and Teaching”, doctoral students may reflect on the integration of sustainable development within their own education. The course “Leading Educational Development” also includes sustainable development as one of the themes that are addressed.

## Education

The action programme for integrating sustainable development into education programmes is now carried out at School level, as the work at programme level is monitored annually in the programme analysis. As a result, the work on sustainability integration in the programmes is part of the quality assurance system. The results from the interim survey this year included answers regarding sustainability integration in the programmes. The responses show variations between Schools and between programmes within Schools, indicating opportunities for development.

During the year, work has been carried out to communicate online how KTH’s courses are linked to the UN’s global goals. Each programme at first and second cycle level has selected between one and three of the goals to which the programme can contribute, and has described what individuals can work with following graduation that is relevant to sustainable social development. In addition, students applying for scholarships to cover their tuition fees must, from this year, write the grounds for their application with a sustainability focus.

Funds from the grant for first and second cycle education have been set aside for a number of education-related projects, known as Environment and Sustainable Development across Disciplines (MHU på tvärs). One example is the development of a freestanding course and open lecture series entitled “The Climate Crisis: how we change it from the world’s challenge to the world’s opportunity”.

Another example is the fact that funds have been granted to a School-wide collaboration in order to develop second-cycle education within the circular economy. The number of first-cycle and second-cycle study programmes with a focus on the environment and sustainable development is the same as in recent years, with two Master of Science in Engineering programmes, ten master’s programmes and one doctoral programme. The number of courses specifically marked as related to the fields of the environment or sustainably has increased from 672 to 738 between 2018 and 2019.

At the Schools, course and programme development is being conducted in several areas. One example is the School of Engineering Sciences in Chemistry, Biotechno-

logy and Health (CBH), which has developed a course in sustainable development for master’s students from other universities.

## Research

Via the building up of networks and particular support for preparing applications, the KTH Sustainability Office supports larger applications in the field of sustainability. Ten interdisciplinary and multidisciplinary initiatives within research, education and collaboration have been granted funds of up to SEK 100,000 each within the framework of the initiative Environment and Sustainable Development across Disciplines. Some of these received an additional SEK 50,000 to cooperate with small and medium sized companies with regard to sustainability.

In 2019, 35 percent of the notifications of a vacancy for a faculty position were linked to sustainable development, which is an increase of eleven percentage points compared to the previous year. Between 2017 and 2018, scientific publications in the field of sustainability increased from 19 percent to 20 percent of KTH’s publications (this indicator is measured with a one-year lag). A project aimed at investigating publications that address the UN’s sustainability goals has been carried out by KTH’s library and will be used for future evaluations of research at KTH. During the period 2018 to 2019, KTH has retained its ranking in both the Academic Ranking of World Universities (ARWU) (rank 151-200 in Environmental Sciences and Engineering) and the QS rankings (101-150 in the field of Environmental Sciences).

## Collaboration

In order to develop joint collaborations with existing and new partners, stakeholders and students who contribute to sustainable development, KTH has arranged seminars and other activities. In excess of 40 externally and internally targeted conferences, seminars and workshops focusing on sustainable development have been arranged at KTH during 2019. In addition, the KTH Sustainability Office has arranged or supported more than 20 events for internal and external stakeholders. Around 1,000 internal and external stakeholders have participated in these events during the year. For example, the KTH Sustainability Research Day was well attended this year with more than 200 participants, and the recording from the day has been viewed more than 200 times.

Information regarding sustainable development at KTH is available on the website and KTH’s intranet. Current news and information is conveyed via internal newsletters and by the KTH Sustainability Office. An external newsletter regarding sustainable development at KTH is sent to external subscribers. The external newsletter is aimed at the business community, decision makers, governmental authorities and NGOs, has been published seven times during the year and

reaches about 3,200 interested parties. The Vice President for Sustainable Development has continued blogging about sustainable development every other week. In addition, students with a focus on sustainable development blogged to an international target group roughly twice a month during the spring. Information concerning calls for research proposals within the fields of the environment and sustainable development has also been sent out to doctoral students and academic researchers around twice a month.

KTH participates in a large number of networks in sustainable development, including in the Sustainable Development Solutions Network Northern Europe, the Nordic University Administrator Collaboration NUAS, the International Sustainable Campus Network (ISCN), the Network for Sustainable Business and the Fossil Free Sweden network. During the year, KTH hosted a network meeting regarding environmental management in universities and colleges, as well as hosting Accelerating, an international conference on the integration of sustainable development in education. KTH's academic researchers are involved in several studies and delegations that support the work of the Swedish Government. These include the Swedish Government's Innovation Council, the Climate Policy Council, the Agenda 2030 delegation and the Delegation for a Circular Economy.

KTH has continued to participate in the UN's 10-year framework programme for sustainable consumption and production with a focus on procurements. Three cooperation agreements focusing on the environment and sustainable development have been further developed alongside the Stockholm Environment Institute (SEI), the IVL Swedish Environmental Research Institute and Akademiska Hus. IVL and SEI have transitioned to become strategic partners for KTH. During the year, work has commenced on addressing more clearly sustainable development in all of KTH's strategic partnerships. This work is part of the Vinnova project Agera. Within the framework of the Conference of European Schools for Advanced Engineering Education and Research (CESAER), KTH has highlighted the sustainability work and participated in a workshop during which KTH presented its work on ranking.

In 2019, KTH has been mentioned in roughly 4,600 national and international media items related to sustainable development – an increase from around 3,200 in 2018. For 2019, 36 percent of KTH's total media exposure is linked to sustainable development, up from 27 percent in 2018. This increase is primarily due to an increase in international attention. In all, 18 press releases have been sent out in Swedish, which is a decrease compared to 2018, as well as seven in English, which is an increase from 2018.

## Sustainability projects on campus

During 2019, KTH has implemented projects according to the Campus Plan for 2018–2023, with the focus on a sustainable future. The Campus Plan describes the strategic planning of buildings and grounds for the all of KTH's campuses.

KTH's total reported CO<sub>2</sub> emissions from business travel in 2019 amounted to approximately 4,580 tonnes, which represents a decrease compared to 2018 of approximately eight percent (approximately 420 tonnes). Calculated per full-time equivalent, emissions have decreased by nine percent compared to 2018.

Within the framework of the Travel-free Meetings in Public Authorities project (REMM), KTH has continued working on the Climate and Economic Research in Organisations project (CERO) in a collaboration between the KTH Sustainability Office and an academic researcher at the School of Architecture and Built Environment (ABE). The project includes both financial and environmental analyses of business trips and commuter travel as well as workshops. A travel habits survey was conducted during the year, where KTH's employees had to answer an online questionnaire about their travel to and from work and about their business trips. The response rate was 40 percent and the results will form the basis for the ongoing work aimed at reducing emissions from KTH's travel. An action programme has been developed in collaboration with a number of departments within joint operational support, and has been authorised by the President.

At the start of 2019, the President, along with a large number of universities and colleges in Sweden, signed up to the Climate Framework, which has been developed at the initiative of Chalmers and KTH. The Climate Framework includes undertakings to develop goals and measures in order to contribute to the climate adaptation in line with society's national and international commitments. In line with this, the President decided at the end of the year on climate goals and overall measures for KTH.

A climate pot was introduced in 2019 with the aim of encouraging reduced air travel by earmarking funds from each School's basic funding for 2020 for projects that reduce KTH's emissions and help KTH to achieve its sustainability goals. The size of the climate pot allocated to each School is based the School's travel.

A waste project aimed at improving and achieving a uniform sorting at source system for the whole of KTH has continued during 2019. The project includes the introduction of sorting food waste and packaging, where possible. Most of the teaching premises on all the campuses have received uniform sorting at source facilities during the year. At most Schools, the potential to sort food waste and paper packaging has been launched. The introduction of uniform signage and information about sorting at source has also taken place during the year.

During the year, KTH has collaborated with the Sustainability Council, which is a group under THS comprising students who have come together to promote environmental and sustainability work at KTH. For example, the students have attempted to influence the restaurants on campus regarding their handling of food waste and disposable plastic materials.

The annual cycling day was arranged in conjunction with Arrival Days for international students. During the cycling day, students and staff were given information about cycle paths and the opportunity to try out electric bikes. In collaboration with Stockholm Vatten och Avfall and the City of Stockholm, events were coordinated on theme of reuse during May and during the Arrival Days in August. Stockholm Vatten och Avfall's Pop-up reuse containers were available at KTH Campus to encourage students and employees to recycle and reuse more. The Environmental Commissioner for the City of Stockholm participated in a seminar for more than 100 students and employees on the theme of reuse.

The School of Industrial Engineering and Management (ITM) has worked actively to coordinate reuse and purchasing aimed at reducing the amount of waste, for example through the purchase of uniform furnishings.

KTH Campus has had four beehives in 2019. The bees have produced 123 kg of honey during the year. The honey is used in restaurants and cafés at KTH Campus and is available to buy in KTH Entré.

During the year, the KTH Sustainability Office has been involved more actively in the procurement process, to support the setting of environmental and sustainability requirements in procurements. The work regarding the following up of stipulated requirements has commenced.

# Gender equality, diversity and equal opportunities

The work on gender equality, diversity and equal opportunities (JML) at KTH relates to safeguarding democracy, people's equal value and human rights and freedoms. In addition, the JML work permeates the organisation such that it affects quality, skills provision, competitiveness and finances. In particular, JML relates to creating and maintaining a good and safe working and study environment for both employees and students.

KTH's Development Plan for 2018–2023 determines that gender equality and the rejection of all forms of discrimination are both a quality-assurance issue and a self-evident component of the university's core values. In-depth work is required in terms of creating awareness and developing skills with regard to equal opportunities and core values, in order for us to achieve our goal of an open and welcoming university. A more equal KTH entails:

- to have a more even distribution of women and men within the organisation and in decision-making bodies
- to have gender-aware leadership
- to have integrated the gender perspective into all courses, study programmes and research
- to work towards also achieving equal opportunities outside KTH
- to divide resources from an equal opportunities perspective and with equal conditions for staff across different areas of KTH

KTH's overall Operational Plan for 2019 describes how the university will work with equal opportunities in courses and study programmes, research and collaboration in the current year. The plan states that:

- knowledge and awareness regarding gender and equal opportunities must be integrated into all courses and study programmes so that, after graduating, students will be able to contribute to a more equal society
- the gender perspective must also be integrated into research to a greater extent. Several funders include gender equality aspects when evaluating research applications. The question of how to address gender equality in research projects must constitute part of the support for research applications
- KTH must also work outwardly for greater gender equality in academia and society at large, together with our strategic partners and international contacts

## Gender mainstreaming of KTH – JIKTH

KTH's work on gender mainstreaming is structured according to Plan for Gender Mainstreaming of KTH – JIKTH. Four priority goals for the gender equality work at KTH have been formulated based on the mapping out of inequalities. These

are: collective organisation, knowledge and awareness, equal opportunities and inclusive cultures.

A selection of the activities in the Gender Mainstreaming Plan that have been implemented or initiated in 2019 are summarised below.

## Organisation of JML in structures and processes

A collective organisation refers to the development of a structure for systematic JML at KTH, where discrimination legislation, working environment legislation, gender mainstreaming and values work are linked together. The KTH Equality Office has been established on the basis of this interim goal. A clear structure for the management and organisation of the JML work throughout the whole of KTH has been developed through a JML manager (JMLA) at each School, JOS and THS. The JMLA group is led by the Vice President for Gender Equality and Values. KTH is also continually reviewing its existing processes in order to ensure that these contribute to gender equality, diversity and equal opportunities.

KTH conducts research-based proactive work at both a strategic and a practical level, with the aim of increasing gender equality, diversity and equal opportunities from an intersectional perspective throughout the university's organisation. This is based on both legal requirements as well as internal governing documents and guidelines. In cooperation with other players within the faculty and operational support, the process of change is being systematised, streamlined and expanded. The work is being conducted in relation to both employees and students, and focuses on both structural and cultural aspects of inequality.

The JMLA group is a strategic group for JML that meets regularly for coordination, topping up knowledge and the exchange of experiences. The JMLA is responsible for coordinating and running the local JML work, focusing on both the working environment and the study environment. Each JMLA organises a local group in the manner that best suits their own organisation. The local process of change has been documented in 2019 in a joint JMLA report.

Examples of processes in which JML perspectives have been integrated or developed in 2019 include:

- continual following up and the quality dialogue
- the Swedish Discrimination Act's requirements regarding active anti-discrimination measures have been integrated into the continual follow-up process
- handling cases of sexual harassment against students
- continued development of the local JML groups and other structures for JML work in the Schools, within joint operational support and within the Student Union

## Knowledge and awareness

Knowledge and awareness of gender and gender equality requires initiatives throughout the organisation. Research-based knowledge about gender forms the basis for problem description and analysis, and knowledge of how change can be driven in an organisation is important in respect of the gender equality work in practice. Knowledge-raising efforts are conducted e.g. within leadership development, higher education teaching, staff training of various kinds and within education for students.

In 2019, ongoing pilot projects regarding gender mainstreaming in mechanical engineering and vehicle engineering have continued and been developed. Development work within the programme leading to the Degree of Master of Science in Engineering with a major in industrial economics contributed e.g. to a number of films, which were shown as a basis for discussions in the programme-related course. Within several programmes, modules in respect of diversity and inclusion continue to be implemented. In addition to modules, initiatives are also being conducted in the form of lectures and seminars in several courses that recur every year.

The course “Leading Educational Development”, which is gender integrated, is offered every year. A new course in higher education teaching, “Gender and Gender Equality in Higher Technical Education”, was conducted in 2019. This course is an important piece of the puzzle in the development work for increased gender awareness in all of KTH’s courses. The participating teachers acquire knowledge in the field of gender and education, as well as theoretical scientific knowledge that will help them in their own work regarding course arrangements. Gender research from various parts of KTH has also been included in the course. The examination contains elements where the teachers have to apply the new knowledge in analyses of their own courses.

“Gender and Change Management” is a development programme that was conducted during 2017–2018, and which involved 18 women in leadership positions in both administration and faculties. The purpose of the programme is to develop women as change managers and thus increase the influence of women in the design of the long-term equal opportunities work at KTH. At meetings, experiences of change-leading initiatives are exchanged, and the participants discuss KTH’s development in the field of JML both generally and at a local level, in collaboration with the project managers. During the latter part of 2019, group interviews were conducted with all participants to follow up the programme.

The Equality Office works systematically with training in respect of JML, both prior to and when receiving new students. Part of this work involves conducting workshops with students who are change leaders within THS, in order to develop them into workshop leaders for other students, known as the “train the trainer” approach. This makes it possible for a larger number of students to participate in JML

workshops within the framework of the orientation reception. In addition to the orientation reception, a number of workshops have been conducted for students working within THS’s sections, the Malvina network and participants in KTH’s Equality Week.

KTH has presented his work on gender mainstreaming and other JML work in a large number of internal and external contexts during the year. For example, the Equality Office conducted a workshop on method development within gender equality work for KTH employees in collaboration with the Copenhagen Business School and the Hanken School of Economics in Helsinki. An all-day workshop on gender mainstreaming with other technical universities in Sweden and the Swedish Gender Equality Agency has also been arranged. The work on gender mainstreaming at KTH has been presented to the Young Academy of Sweden, the KTH Alumni Advisory Board, Chalmers University of Technology, the Norwegian University of Science and Technology in Trondheim, the Arctic University of Norway in Tromsø and a management network comprising 20 women in managerial positions from Chile.

## Equal opportunities

This includes various initiatives intended to create equal opportunities in terms of salary, power and career. One example is the continued work on faculty development from a JML perspective. KTH needs to have equal processes in respect of recruitment, assessment and employment, as well as the preconditions for equal resource allocation.

The FFAGroup (responsible for future faculty) has worked from an early stage on faculty regeneration with a focus on gender mainstreaming. The members of the group comprise Deputy Heads of Schools or Heads of Schools from all the Schools, and are headed by the Dean.

The Dean has carried out preparatory work prior to a new round of training for chairmen and members of committees for the recruitment and promotion of faculty. The Vice President for Gender Equality and Values and an expert from the Equality Office have participated in the preparatory work and will take part in the planned training in 2020, which will address areas such as gender equality.

The Partners in Learning (PIL) programme is a career support programme for KTH’s assistant professors. The programme is run continuously. It includes modules with JML and, in 2019, has been further developed to have an even greater focus on gender mainstreaming.

In order to generate collaboration in respect of the JML work, an internat for the two strategic groups JMLA and FFA has been arranged in both 2019 and 2018. The themes at this year’s internat were the PIL programme, skills-based recruitment and inclusive leadership. These joint internats will be arranged annually in future to ensure ongoing continuity in the work.

According to the Swedish Discrimination Act, the employer must identify and analyse each year those provisions and practices relating to wages and other employment conditions that are applied by employers, with a view to discovering, rectifying and preventing unjustified differences in pay and other employment conditions between women and men. Differences in pay between women and men carrying out work that should be regarded as equal or equivalent must also be identified and analysed.

As in previous years, the 2019 salary survey shows that KTH's salary structures and salary setting have a tendency to be characterised by inequality in certain areas. This follows the structural patterns regarding female and male-dominated professions in the labour market in general, where areas with equivalent degrees of difficulty demonstrate differences in pay in relation to gender. Based on the salary survey, an analysis has been conducted regarding pay differences in equal and equivalent work. The results have been communicated to the Schools and used in the salary review work in order to even out any unjustified differences in pay. The employees' organisations have had access to and been involved in the salary survey work.

KTH takes gender equality aspects into account in its own calls for strategic funds, as well as in nomination processes relating to major research applications. Gender equality in the allocation of research funds is a part of the quality system and is followed up in the annual quality dialogues. According to KTH's plan for gender mainstreaming, KTH will investigate how gender equality can be further taken into consideration in the allocation of resources. KTH has appointed a working group, led by the President, which is tasked e.g. with carrying out a review of the issue of equal resource allocation.

### **Inclusive cultures**

Inclusive cultures refers to an awareness of values, a code of conduct and how an inclusive culture can be created; an awareness of the relationship between sustainable development and JML issues; a clear zero tolerance of harassment and discrimination as well as transparency and clarity in communications regarding the JML work.

In 2019, the results of a study looking at processes for dealing with sexual harassment among students have been integrated into procedures and documents. Communication with students regarding KTH's handling has been clarified.

KTH, alongside Karolinska Institutet and Malmö University, has initiated a research and collaboration programme intended to combat sexual harassment and gender-based vulnerability. The goal is to establish research-based knowledge about inclusive working and study environments as well as a sustainable organisation for the prevention of sexual harassment and gender-based vulnerability in the academic world. The programme will ultimately help to strengthen and intensify the work on the university's organisational culture, with the focus on quality, sustainable development, the working environment, leadership, gender equality and equal opportunities. The programme includes a national study regarding the prevalence of sexual harassment throughout the Swedish higher education sector, the development of new research-based knowledge about sexual harassment, as well as the development of common platforms for research collaborations and the process of change.

During 2019, KTH has continued its work on the systematic integration of JML in the orientation reception activities through a collaboration with THS. All project managers, team managers and sponsors involved in the orientation reception have received training in JML and have attended workshops on handling cases of sexual harassment. A film about the JML work has been produced for newly admitted students at KTH.

# Staff

KTH is a university where people with a wide range of different backgrounds and experiences work together with the common purpose of managing, renewing and imparting knowledge for the society of today and tomorrow. KTH should be a workplace where the desire for personal development and the taking of personal responsibility are encouraged. The Development Plan for 2018–2023 states that KTH will be a leading technical and international university that generates knowledge and expertise for a sustainable future. KTH is striving to achieve the goals in the development plan, i.e. to be at the forefront, integrated, visible, open, more digital, more sustainable, more international and more equal. A number of activities that have been conducted in 2019 in the field of human resources are outlined below. These are based on KTH's development plan.

## Skills provision

The overall goal of KTH's skills provision is that KTH should always have access to the skills that the operation needs in order to achieve its goals. This requires that the work on skills provision should take place in a strategic and structured manner, and that KTH should work actively on its employer brand in all communications, both internally and externally. During 2019, KTH has worked on a number of activities in the field of skills provision. The monitoring of skills provision and faculty development takes place in conjunction with the annual internal quality dialogue. The Schools' skills provision plans have been further developed during the year.

## Skills and career development

For a leading, integrated, visible and open KTH, the employees' skills, ability to cooperate and opportunities for operational and skills development are of great importance. KTH promotes lifelong learning through courses and skills development initiatives, in order to contribute to a common KTH. Sustainable development, digitalisation, internationalisation and gender equality goals are all integrated in methods and course content. In 2019, 810 employees participated in centrally funded skills development activities. The gender distribution is 34 percent men and 66 percent women.

## Introduction

New employees are introduced at both strategic and operational level in order to promote affinity with KTH. The bilingual welcome day in Swedish and English brings together all new employees to provide a common university context. Good examples of research, education, operational support and collaboration that contribute to societal development and benefits are highlighted, and KTH's management describes values and visions. The welcome day is held four times a year. In 2019, 185 employees participated, of whom 120 were women and 65 men. All new employees have access

to three introductory courses regarding the higher education sector and its governing principles, the environment and GDPR.

The in-depth introduction to KTH and the higher education sector, for technical and administrative staff, aims to promote cohesive, professional and accessible operational support for an integrated KTH. The six-month programme is based on KTH's Development Plan for 2018–2023, is conducted once a year and includes seminars, exchanges of experiences and internal job shadowing. In 2019, the programme had 22 participants, including 19 women and three men.

## Staff training

A quality-conscious approach and legally certain operations are supported by basic and systematic staff training in HR, law, security and government administration. Regulations, processes and practices are made visible in each area. In addition, special efforts have been made regarding course development in areas such as language, recruitment, IT and administration.

To support integration, internationalisation and bilingualism, workshops have been conducted in the fields of rhetoric and presentation techniques, professional communication and intercultural communication and diversity.

In order to promote bilingualism at KTH, English language courses have been conducted at Cambridge University with the support of Erasmus+. Since 2015, there have been 136 participants on these courses. During 2019, 36 employees participated, including 30 women and six men.

During the year, KTH has conducted courses in Swedish as a foreign language for foreign employees at five levels with six different courses, of which Swedish for teaching is a new course. In addition to the courses, individual teaching has also been conducted. In total, almost 200 people have participated. To provide further support, teacher-led language cafés for foreign employees at various language levels were held at KTH Campus and KTH Kista.

As part of the digitalisation and sustainability work, KTH has implemented a number of targeted efforts to make video conferencing systems available to all employees. In 2019, training regarding the execution of videoconferencing was given approximately once a month, with the aim of increasing the number of virtual meetings and thereby reducing KTH's environmental impact from business travel. With the new Administrative Procedure Act from 2018, development of the course "Do you know about administration according to the Administrative Procedure Act?" was initiated. Parts of the course were digitised and, using the flipped classroom methodology, there are now greater opportunities for in-depth discussions. In 2019, the training was given to 46 employees, including 36 women and ten men.

During the year, a work has also been initiated regarding course development within discussion methodology for cases of discrimination, harassment, sexual harassment and

victimisation, in response to needs for action that have been identified in connection with KTH's study on the management of sexual harassment among students. The study is presented in KTH's Action plan against discrimination for KTH as an education provider in 2019.

### Career support

Various forms of career support activities are offered to employees at KTH to develop expertise or a new role. In addition to the examples below, individual coaching in rhetoric for educators and lecturers has been provided during the year.

"Swedish and Swedish (work) culture" is an eight-week establishment programme that is aimed at employees from abroad, presenting various career paths and what is required for a career in Sweden. The Swedish labour market, languages, traditions, laws and other governing principles in Swedish society are explained. For KTH in a global world, all programme participants also have a Swedish-speaking KTH employee as a study-buddy for networking and mutual intercultural awareness. Seven women and eleven men participated in 2019.

Assistant professors, associate professors and professors have been given the opportunity to apply for funding for a limited period, referred to as a sabbatical period, to spend time at another institution of higher education or external party outside the university in order to concentrate on education and research. The sabbatical period has been financed with central funds and funds from the School level. New features for 2019 were that special emphasis should be placed on the equal nomination of applicants and that the central grants have been increased. In 2019, three men and two women have applied for and been granted international sabbaticals.

All staff at KTH are encouraged to carry out an international exchange or job shadowing at a partner university. During the year, 29 people, including 15 women and 14 men, completed Erasmus+ mobility in the form of courses, guest lectures, job shadowing and visits to partner universities.

KTH provides employees with support for life and career planning, in order to promote development as well as internal and external mobility. Life and career planning includes individual guidance and coaching and is funded by local joint conversion funds. During the year, a total of 31 employees, including 20 women and 11 men, applied for and completed life and career planning.

KTH's managerial and leadership programme, steps 1–3, aims to make the leadership role manageable and comprehensible through increased understanding of systems. Leading in the academic world is a complex task, and KTH can see advantages in managers at all levels and within various activities areas participating together. In this way, it is possible to increase understanding of the fact that the exchange of experiences and networking are success factors.

The programme had 46 participants during the year, including 31 women and 15 men.

All new managers at KTH have access to a mentor. In collaboration with other universities in Stockholm and companies in Sweden, KTH offers two mentoring programmes each year. 16 individuals from KTH participated during the year, including ten women and six men.

In addition, subject-specific courses are provided regarding regulations, processes and practices that are required knowledge for managers and leaders at KTH. These courses include Basic labour law parts 1 and 2, structured interview technique and skills-based recruitment, Managing labour disputes with mediation and Crisis and human support.

An employment position within the academic career path, the "Tenure track," means a long-term commitment from KTH in the form of resources and personal development opportunities. The career development support clarifies what is required to obtain the requisite qualifications and experience to become an associate professor or professor, and offers opportunities for development within relevant areas.

Skills support for active career planning for assistant professors is offered in the "Partners in Learning" (PIL) programme, with the aim of clarifying the requirements for further qualifications to become associate professors and professors and to develop the participants' awareness of academic leadership and KTH's values. In 2019, the programme has had 16 participants, including ten men and six women.

In order to create awareness of their own significance as role models and leaders, associate professors are offered leadership training. The aim is to increase knowledge about the development of groups, its processes and the importance of leadership in the group. The number of participants in "Leadership for Associate Professors" was 13, including four women and nine men.

### Relocation

KTH Relocation works primarily with the reception and integration of those individuals who KTH recruits from abroad. Reception refers to employees and scholarship recipients as well as to those employed by a party other than KTH, although who are intending to carry out a longer exchange or a sabbatical period at KTH. In 2019, around 900 people registered with KTH Relocation. Assistance is principally requested in relation to finding accommodation, which is provided during the first year at KTH. Other activities include excursions, guided tours, and various gatherings in order to network with both Swedes and other new recruits, language and culture training, all with the aim of facilitating integration in Stockholm and Sweden and making it possible for the person quickly to settle into KTH's organisation and governance. There is also a procured career support programme for individuals accompanying professors, associate professors and assistant professors.



## Management, leadership and employeeship

A leading KTH is driven forward by professional leadership based on KTH's values and an awareness of sustainability and gender equality. Particular focus during the year has been placed on working for a more gender-conscious and inclusive leadership. The Schools have explored their environments and carried out various activities, such as training and workshops at management internats and management seminars. Leadership issues are crucial for maintaining and increasing gender equality and diversity at the university, as well as for creating the conditions for a good working environment and long-term leadership provision.

As leadership is part of the position or is limited in time, it imposes high demands for developed employeeship and for the development and use of the expertise within operational support. Professional leadership means working together and being a role model, trusting others to do their best, being knowledgeable about employer issues and being loyal with decisions. KTH offers training, coaching, guidance, mentoring, arenas for dialogues and networking, as well as platforms for collaboration in order to meet these needs.

## The working environment

In the systematic work on the working environment, KTH works e.g. with recurring health surveys, digital support materials and education. The Schools draw up annual working environment plans, where activities in the physical, organisational and social working environment are documented and followed up. The experience group within systematic work on the working environment has met several times during 2019.

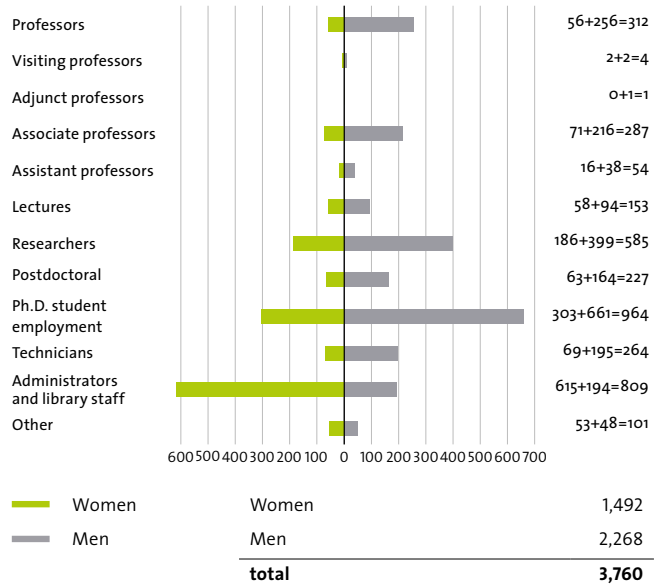
In order to draw attention to a particularly important area in respect of the working environment, the President decided that discrimination, harassment, sexual harassment and victimisation would be the President's priority area in relation to the working environment for the years 2018–2019. Within this framework, all Schools have been tasked with conducting dilemma exercises on this topic. During 2019, approximately 1,350 employees have completed dilemma exercises.

The number of safety representatives has increased and their influence and involvement in KTH's working environment activities is continuing to be developed and strengthened. Several courses have been provided for safety representatives and two safety representative meetings have been held. The safety representatives participate in investigations into incidents and occupational injuries, and a new procedure regarding safety rounds in public classrooms has been developed by the Health and Safety Committee. Classrooms are an important working environment for both students and teachers at KTH.

Staff training in cardiopulmonary resuscitation, basic fire safety and the working environment for safety representati-

Figure 16

### Staff 2019



Source: HR+

ves is provided systematically each year in order to safeguard the working environment. Ergonomics rounds can be ordered for the workplace via the occupational health service.

During 2019, initiatives have been carried out in respect of preventive healthcare through increased wellness grants amounting to SEK 3,000 per employee per year.

## Staff structure

The average number of employees in 2019 has increased by 119 to 5,044 (2,119 women and 2,925 men), compared with 4,925 in 2018 and 4,952 in 2017. When converted to full-time equivalents (FTEs), there has been an increase of 132 to 3,760 (1,492 women and 2,268 men) in 2019, compared to 3,628 FTEs in the previous year. In 2017, the number of FTEs stood at 3,563. Measured in FTEs, the proportion of women has increased by one percentage point to 40 percent compared to 2018.

## Age structure

The average age of employees at KTH is 40 years (41 for women and 39 for men). The average age of teachers and academic researchers is 41 years (41 for women and 41 for men). Average age of doctoral students employed at the university is 30 years (31 for women and 30 for men). The average age of technical and administrative staff is 46 years (45 for women and 46 for men).

## Teaching staff and academic researchers

The number of teaching staff has fallen by three FTEs to 810

(women have increased by four to 203 and men have fallen by seven to 607). This professional group is made up of professors, visiting professors, adjunct professors, associate professors, assistant professors and lecturers. The proportion of women among teaching staff has increased by one percentage point to 25 percent compared to 2018.

### **Professors, visiting professors and adjunct professors**

In 2019, the number of FTEs within the professor group (professors, visiting professors and adjunct professors) has increased by nine FTEs to 317 (women have increased by five to 58 and men by four to 259).

Professors have increased by ten FTEs to 312 (women have increased by five to 56 and men by five to 256). The proportion of women has increased by one percentage point to 18 percent. The number of visiting professors has decreased by one FTE to four (women remain unchanged on two and men have decreased by one to two).

In 2019, 32 new professors and visiting professors have been employed. Of these, the proportion of women was 25 percent. The number of new professors and visiting professors employed totalled 25 in 2018 and 22 in 2017. Of these, the proportion of women was 36 percent and 32 percent respectively. KTH has thereby satisfied the requirements for two of the three years in the period. Over the three-year period, the proportion of women being newly appointed as professors stands at 30 percent.

The number of adjunct professors has increased by five, amounting to 50 at the end of the year (women have increased by two to seven and men have increased by three to 43). The proportion of women has increased by three percentage points to 14 percent. During the year, five people have been newly recruited to an adjunct professor position (one woman and four men). All adjunct professors are employed by KTH, although their primary activities are located outside of KTH. The employment covers a minimum of 20 percent and a maximum of 30 percent of full-time, and most of these adjunct professors do not receive any salary from KTH. The number of FTEs for those who receive a salary amounts to one man in 2019.

### **Associate professors and lecturers**

The number of associate professors has increased by seven FTEs to 287 (women have increased by five to 71 and men have increased by two to 216). The proportion of women has increased by one percentage point to 25 percent compared to the previous year. During the year, 23 new lecturers have been employed (eight women and 15 men). The proportion of women among the new employees has increased by two percentage points to 35 percent compared to 2018.

The number of lecturers has decreased by six FTEs to 153 FTEs compared to 2018. The proportion of women in this category has increased by one percentage point to 38 percent compared to the previous year.

### **Career-development positions: assistant professor and postdoc**

At KTH, assistant professors and postdocs make up the category of career-development positions. In 2019, the number of career-development positions has increased by 11 FTEs to 281 (women have increased by three to 79 and men by eight to 201). The proportion of women with a career-development position stands at 28 percent, which is unchanged compared to 2018 and 2017.

The number of assistant professors has decreased by 12 FTEs compared to 2018 (women have decreased by three to 16 and men by eight to 38). The proportion of women is unchanged compared to 2018, at 30 percent. During the year, 13 assistant professors have been employed, three women and ten men. This is a decrease of ten percentage points in the proportion of women compared to the previous year.

The number of postdocs has increased by 23 FTEs to 227 (women have increased by six to 63 and men by 17 to 164). The proportion of women is unchanged compared to 2018, at 28 percent. Postdoc is a fixed-term position for a maximum of two years.

### **Researchers and research engineers**

Researchers and research engineers have increased by 28 FTEs to 585 (women have increased by 15 to 186 and men have increased by 13 to 399). The proportion of women stands at 32 percent, which is an increase of one percentage point compared to the previous year.

### **Doctoral students with an employment position**

Doctoral students with an employment position have increased by 28 FTEs to 964 during 2019 (women have increased by 21 to 303 and men have increased by seven to 661). For doctoral students with an employment position, the proportion of women stands at 31 percent, which is an increase of one percentage point compared to 2018.

### **Technical and administrative staff**

Technical and administrative staff, including library staff, have increased by 56 FTEs to 1,073, compared to 1,017 FTEs in 2018 (women have increased by 39 to 684 and men have increased by 16 to 388). The proportion of women has increased by one percentage point to 64 percent compared to the previous year.

### **Docents**

KTH has appointed 32 docents during 2019, including nine women and 23 men. Being appointed as a docent is part of an academic career in which teaching staff and researchers, by acting as primary academic supervisors for doctoral students, can build up their own research groups.

# Premises

At the end of 2019, KTH had approximately 284,000 m<sup>2</sup> of premises, excluding accommodation for students and visiting researchers. Just over 30,000 m<sup>2</sup> are sublet to e.g. the Red Cross University College of Nursing, Stockholm University and Karolinska Institutet. The share of vacant premises stands at 2.5 percent, which is an increase from previous years. The vacant premises are primarily office premises, individual lab premises and storage rooms.

At the new Albano campus, the final phase in the production of Building 3 is under way, a building with lab and office space adapted for the School of Engineering Science. KTH will rent out part of the office premises to Stockholm University.

The autumn term 2019 saw the completion of the first phase out of five in the redesign and development of the study environments in the main building, Lindstedtsvägen 3 and 5.

## **Accommodation for students and visiting researchers**

KTH currently arranges a large number of student apartments and student rooms for exchange students, master's degree students from abroad and visiting researchers.

In 2019, KTH Accommodation was able to provide accommodation for approximately 1,860 students. The rental portfolio amounts to 1,258 rooms and apartments with a total of 1,457 beds. The occupancy rate has been approximately 86 percent over the whole year. During the autumn term,

occupancy stood at 99 percent, while during the spring term it was 95 percent. Maintenance and cleaning are carried out during the summer, when the accommodation is empty.

KTH Relocation provides accommodation to foreign doctoral students and visiting researchers. KTH had total holdings of 280 residences spread across the Greater Stockholm area in 2019. The occupancy rate was 95 percent. In addition to this accommodation, there is also a guesthouse, Matsällskapet in Solna, with an occupancy rate of around 75 percent. In total, more than 800 incoming visiting researchers and newly employed foreign visiting researchers and doctoral students have obtained their accommodation via KTH in 2019. KTH Relocation has offered a housing solution to all individuals who have made contact with them. KTH estimates that the need for accommodation for foreign doctoral students and visiting researchers is currently covered.

In 2019, the block leases that KTH had on Högalidsgatan and in Bagarmossen regarding accommodation for visiting researchers were terminated, with the result that the portfolio has been concentrated on KTH Campus and Tensta/Hjulsta.

During the year, the final phase of the new student accommodation at KTH Campus has been completed. In August, around 200 students moved into these 112 apartments. The total number of places in student accommodation at KTH Campus is approximately 1,000, and these are offered to both students and visiting researchers.

# Finances – earnings, use of resources and financing

## Financial results and change in capital

KTH continues to have strong finances. Income and expenditure have increased compared to 2018, and this increase is higher than the forecast set out in the budget documentation for 2020–2022. Several initiatives and events have affected finances during 2019, both positively and negatively.

The financial results for 2019 amount to SEK -69 million, compared to a surplus of SEK 88 million in 2018. The results are divided between a deficit within first-cycle and second-cycle programmes totalling SEK -43 (27) million, and a deficit within research and third-cycle education amounting to SEK -26 (61) million. The total budgeted forecast for KTH was a surplus of SEK +24 million.

The earnings within first-cycle and second-cycle study programmes are significantly affected by a reported provision of almost SEK 29 million for the termination of an agreement regarding student accommodation. This accommodation has been empty in 2019. See also the Premises section. Without this exceptional cost, earnings within education would have been SEK -14 million.

The financial results are also affected by the fact that KTH is the principal for SciLifeLab. KTH has received SEK 381 million in the research grant for the operations within SciLifeLab in 2019, a large part of which is transferred to other participating universities. The appropriation is deducted in its entirety in connection with KTH receiving the funds and is not accrued. In previous years, the appropriation funds for developing the infrastructure at SciLifeLab and the funds within SciLifeLab for research in the early stages of drug development have not been used in their entirety, which has resulted in surpluses that are included in KTH's government capital. During 2019, the funds within the grant for SciLifeLab have been distributed in their entirety, and SEK 7 million of previous funds have also been utilised, which is having a negative impact on the earnings within research and third-cycle education amounting to SEK 7 million. The situation was the reverse in 2018, with KTH's earnings being positively affected by SEK 20 million.

Revenues have increased by just under four percent compared to 2018, amounting to SEK 5,566 (5,366) million, measured as revenue from operations, including funds for financing transfers. Over the past ten years, KTH's revenues have increased by more than 50 percent, with revenue from operations increasing by 43 percent and transfers by more than 200 percent. The fact that the transfers have increased by so much is primarily due to increased grants for the strategic research areas and the university's role as principal of SciLifeLab.

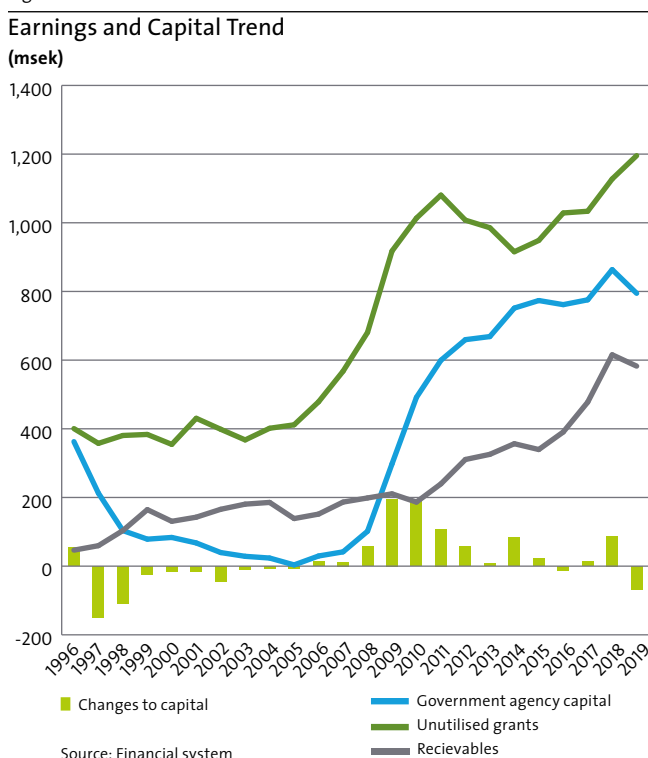
At the end of 2019, government capital amounts to SEK 798 (867) million, which corresponds to 14 (16) percent of revenues as defined above and 16 (18) percent of revenue from

Figure 17

Surplus/deficit			
(msek)	2019	2018	
Revenues	4,962	4,786	
Costs	5,033	4,708	
<b>Profit/loss</b>	<b>-71</b>	<b>78</b>	
Profit/loss subsidiaries	2	9	
Revenues for transfers	605	580	
Grant issued (costs for transfers)	-605	-580	
<b>Profit/loss</b>	<b>-69</b>	<b>88</b>	

Source: Financial system

Figure 18



Source: Financial system

Figure 19

Capital development				
(msek)	Balance carried 2019	Profit/loss 2019	Profit/loss 2018	Balance brought 2018
First and second level studies	27	-44	27	44
Purchased courses	12	0	-1	13
Commissioned courses	-5	1	1	-7
Research and doctoral studies	749	-21	58	712
Commissioned research	14	-5	3	16
<b>Total</b>	<b>798</b>	<b>-69</b>	<b>88</b>	<b>779</b>

Source: Financial system

operations. KTH has made several decisions regarding strategic initiatives financed with government capital. A four-year initiative was launched during the second half of 2016, including areas such as the recruitment of assistant professors. This initiative has affected earnings by SEK -43 (-37) million in 2019. At the end of 2019, a new strategic initiative has been launched following a decision by the Board in 2018. Earnings will not be significantly affected until 2020.

## Revenues

Operating revenues have increased by just under four percent and amounted to SEK 4,962 million in 2019, SEK 176 million more than in 2018.

### First-cycle and second-cycle education

Compared to 2018, these revenues have increased by SEK 23 million and constitute 31 (32) percent of total revenue. Revenues in 2019 amounted to SEK 1,557 (1,533) million.

Revenues from the funding allocation at first-cycle and second-cycle level have increased by just under two percent and amounted to SEK 1,180 (1,159) million. This increase is due to the government's investment in the expansion of engineering programmes, the government's investment in the built environment and continued investment in Södertälje. During the year, KTH has produced full-time student equivalents and annual performance equivalents with a value just below the ceiling amount. A small portion of overproduction saved from previous years has been utilised and KTH has deducted the overall ceiling amount.

Revenues from fees and other income have decreased by one percent, equivalent to SEK 4 million, and amount to SEK 304 million. This decrease is explained primarily by the fact that a review has been conducted within parts of the operation following the restructuring of KTH, and by the fact that revenues from certain tuition fees have subsequently been reclassified as revenues from grants. Revenues from the renting out of accommodation have increased by SEK 2 million and revenues within contract education and ordered education have increased by just over SEK 2 million. Revenues relating to students obligated to pay tuition fees amounted to SEK 153 (142) million, which corresponds to three percent of total revenues in 2019 as well. See further comments on the operations financed by tuition fees below.

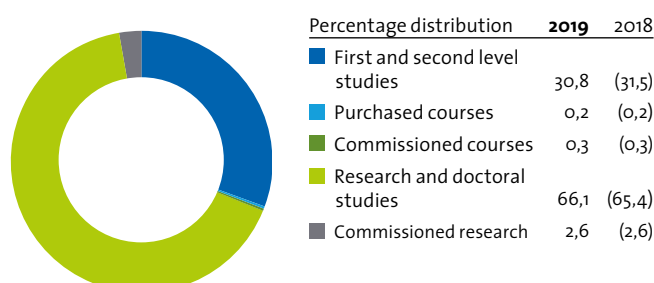
### Research and education at third-cycle level

Revenues account for 69 (68) percent of total revenues and amounted to SEK 3,405 (3,252) million, which is an increase of almost five percent compared to 2018.

Revenues from the funding allocation for research and education at third-cycle level have increased by SEK 21 million compared with 2018, which roughly corresponds to the price and salary conversion. KTH received an additional

Figure 20

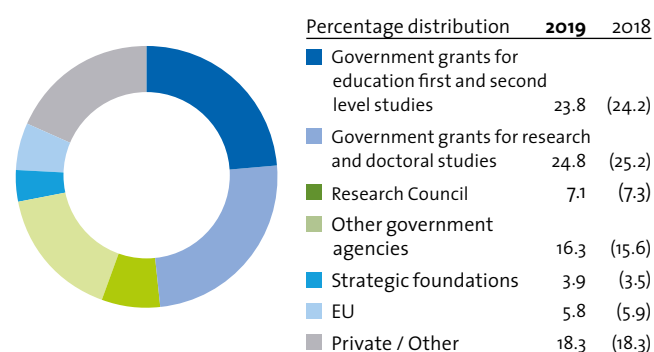
Field of activity 2019 (2018)  
Total msek 4,962 (4,786)



Source: Financial system

Figure 21

Sources of income 2019 (2018)  
Total msek 4,962 (4,786)



Source: Financial system

SEK 15 million in 2019 in accordance with the latest Government research bill. At the same time, a significant portion of the research grant has been utilised to finance transfers within e.g. SciLifeLab. Funds within the grant are thereby reported as transfers, and not within the operation's revenues.

Revenues from fees and other income have increased by SEK 29 million, just under nine percent. Approximately SEK 9 million is due to increased revenues within SciLifeLab and National Genomics Infrastructure (NGI). Otherwise, the increased revenues are distributed among a large number of departments and operations, and are considered to be an expression of the operation's growth and development.

Revenues from grants have increased by SEK 103 million. The revenues from KTH's three largest providers of funding within research and education at third-cycle level, in addition to direct government grants, remain at basically the same level as in 2018. As before, the Swedish Research Council is KTH's largest external provider of funding, with revenues from grants totalling SEK 276 (272) million. The EU is the second-largest external funder, with grant revenues amounting to SEK 256 (257) million. Revenues from the Wallenberg foundations increased significantly last year and

remain at a high level, totalling SEK 223 million in 2019, making it the third-largest provider of funding within research. The Swedish Foundation for Strategic Research is responsible for the largest increase for a single funder, at SEK +24 million. Grant revenues have also increased from the Swedish Energy Agency, at SEK +21 million. More information about KTH's funders can be found in the Research section.

## Costs

Operating costs have increased by just under seven percent and amount to SEK 5,033 million. As described above under Financial results and change in capital, KTH has made a provision of almost SEK 29 million in 2019 for the termination of an agreement regarding student accommodation. This cost is borne in full by the operation for first-cycle and second-cycle education. Without this extraordinary cost, the total costs would have increased by around six percent.

Staff costs have increased by SEK 187 million. This increase is largely due to the number of FTEs having increased by 132 in 2019 compared to 2018, resulting in higher costs for salaries, employer's contributions and pension premiums. Staff costs have also been affected by the annual salary review, as well as by the general increase in pension premiums in 2019. Further information about KTH's staff structure can be found in the *Staff* section.

### First-cycle and second-cycle education

These costs account for 32 (32) percent of the total costs and amount to SEK 1,600 (1,507) million. In addition to the costs for the provision described above, costs have increased by SEK 65 million, mainly due to an increase in personnel costs of SEK 52 million compared to 2018.

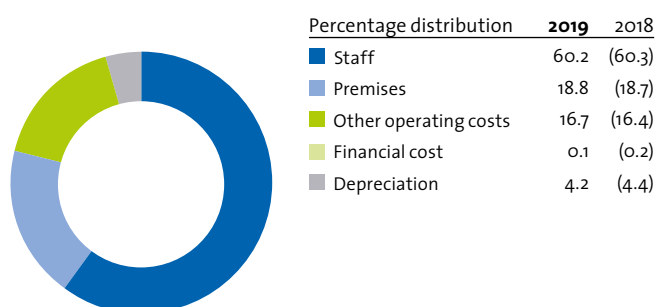
### Research and education at third-cycle level

These costs continue to account for 68 percent of the total costs and amount to SEK 3,433 (3,201) million, an increase of

Figure 22

#### Costs 2019 (2018)

Total msek 5,033 (4,708)



Source: Financial system

SEK 232 million compared to the previous year. Personnel costs are responsible for SEK 135 million of the increase. In addition, costs within other operations have increased by SEK 59 million, mainly due to increased consultancy costs.

Figure 23

#### Outcomes for education at first and second cycle

(msek)	2019	2018	2017
<b>Operating revenues</b>			
Government grants	1,180	1,159	1,080
Revenues from tuition fees and other charges	304	308	269
Revenues from grants	72	65	64
Financial income	1	1	1
<b>Total operating revenues</b>	<b>1,557</b>	<b>1,533</b>	<b>1,414</b>
<b>Operating costs</b>			
Staff costs	876	824	805
Costs for premises	397	371	342
Other operational costs	265	251	270
Financial costs	1	2	2
Depreciation	0	0	0
Total operating costs	61	59	45
<b>Total operating costs</b>	<b>1,600</b>	<b>1,507</b>	<b>1,463</b>
<b>Total operating outcome</b>	<b>-43</b>	<b>27</b>	<b>-49</b>

Figure 24

#### Outcomes for research and education at third cycle

(msek)	2019	2018	2017
<b>Operating revenues</b>			
Government grants	1,229	1,208	1,185
Revenues from tuition fees and other charges	366	337	312
Revenues from grants	1,807	1,704	1,634
Financial income	2	3	4
<b>Total operating revenues</b>	<b>3,405</b>	<b>3,252</b>	<b>3,135</b>
<b>Operating costs</b>			
Staff costs	2,151	2,016	1,922
Costs for premises	547	510	494
Other operational costs	581	522	476
Financial costs	3	5	5
Depreciation	0	0	0
Avskrivningar och nedskrivningar	150	148	175
<b>Total operating costs</b>	<b>3,433</b>	<b>3,201</b>	<b>3,072</b>
<b>Total operating outcome</b>	<b>-28</b>	<b>51</b>	<b>62</b>

# Management of foundations

KTH currently manages 101 private foundations via related management. The foundations have been formed via various donations to KTH. The oldest foundation originated in a gift dating from 1866, which was donated to KTH's predecessor, the Kongl. Teknologiska Institute (Royal Technical College). The donation was from the Wällofliga Borgaståndet and was intended to establish a scholarship fund for students without means who had distinguished themselves through hard work, scholastic aptitude and honourable behaviour. The foundation still grants scholarships for students at KTH.

During 2019, one new foundation has been formed and six foundations have been wound up. The Foundation for Technical Scientific Research and Education was established during the year. The capital, which amounted to SEK 36 million at year-end, is provided by a donor who wishes to remain anonymous.

The following foundations have distributed the entire foundation capital for their respective purposes and been wound up: The Torsten Bergstedt Scholarship Fund Foundation, the F.O. Carlin Foundation, the Gustav De Laval Scholarship Fund Foundation, the Rudolf Graves Foundation, the Gustav and Maria Grevillius Fund Foundation and the Frans Holmgren Scholarship Fund Foundation.

## Management for the purpose of the foundation

The purpose of each foundation is stated in each foundation's charter. In 2019, the foundations affiliated to KTH distributed SEK 17 million.

The largest group of KTH's affiliated foundations, 47 in total, provide scholarships to first-cycle and second-cycle students. From these foundations, the decision was taken to award almost SEK 7 million through 359 scholarships. Of these, just over SEK 3 million constitutes funds from the largest of the foundations that KTH manages, the Henrik Göransson Sandviken Scholarship Fund Foundation. This foundation has capital amounting to SEK 218 million, which will primarily be invested in securities related to Sandvik AB.

Travel grants to teachers, researchers and doctoral students are awarded from 30 foundations. From these, grants totalling more than SEK 4 million have been distributed through 179 scholarships in 2019.

The other 24 foundations contribute e.g. to the research activities at KTH. During the year, the decision was taken to distribute grants totalling approximately SEK 6 million, divided among 56 scholarships for such activities.

The second-largest foundation that KTH manages is the KTH Great Prize Foundation from a donation made in 1944. The donor, who wishes to remain anonymous, stipulated that the prize should go to a Swedish citizen who, for example through epoch-making discoveries, ingenious applications or artistic activities, has been of great significance for Sweden. The prize amounts to SEK 1.2 million and is awarded in conjunction with KTH's ceremony for the conferment of

doctor's degrees and inauguration of professors. The prize was awarded to Dilsa Demirbag-Sten in 2019. The University Board's stated grounds are as follows: "With a strong and inspirational conviction that knowledge and critical thinking are crucial for the development of society, Dilsa Demirbag-Sten has moved from words to actions. Through a solid commitment, she has managed to combine social entrepreneurship with her view of education as both a right and an opportunity – through the creation of the Berättarministeriet (Ministry of Storytelling). The Ministry not only opens the door to higher education, but it is ultimately also a matter of democracy. Dilsa Demirbag-Sten is a very worthy recipient of KTH's Great Prize."

The foundations pay an annual management fee to KTH for the costs incurred in connection with their administration. The fees amounted to SEK 1.8 million in 2019.

## Management of assets

The capital of the affiliated foundations is managed in a discretionary fashion by two external asset managers. This means that the asset managers are entitled to implement transfers and reallocations in the portfolio, within the framework specified in KTH's investment guidelines for its affiliated foundations.

The total amount of the assets belonging to the foundations amounted to SEK 880 (692) million at year-end.

Figure 25

Size and number of foundations  
Capital, MSEK at end of December 2019

	Number	Capital, MSEK
Foundations, 15–217 MSEK	13	572
Foundations, 5–15 MSEK	22	196
Foundations, 1–5 MSEK	44	100
Foundations, up to 1 MSEK	22	12
<b>Total</b>	<b>101</b>	<b>880</b>

Source: Bank statements of the foundations

# Financial Statement

	2019	2018	2017	2016	2015
<b>Operating revenues</b>					
Government grants	2,409,564	2,367,083	2,264,457	2,215,352	2,202,935
Revenues from tuition fees and other charges	670,376	645,225	581,022	543,086	497,627
Revenues from grants	1,878,724	1,769,529	1,698,050	1,662,645	1,647,845
Financial income	2,908	4,001	5,161	5,114	3,164
<b>Total operating revenues</b>	<b>4,961,571</b>	<b>4,785,838</b>	<b>4,548,690</b>	<b>4,426,198</b>	<b>4,351,571</b>
<b>Operating costs</b>					
Staff costs	3,027,200	2,839,754	2,727,105	2,669,311	2,643,190
Costs for premises	944,574	880,878	836,017	807,880	761,362
Other operational costs	845,588	772,464	745,230	731,618	697,741
Financial costs	4,754	7,623	7,566	8,552	5,762
Depreciation	210,442	206,842	219,432	227,156	220,756
<b>Total operating costs</b>	<b>5,032,557</b>	<b>4,707,562</b>	<b>4,535,350</b>	<b>4,444,518</b>	<b>4,328,810</b>
<b>Total operating outcome</b>	<b>-70,986</b>	<b>78,276</b>	<b>13,340</b>	<b>-18,320</b>	<b>22,761</b>
<b>Outcome from shares of subsidiary companies and other interests</b>	<b>2,072</b>	<b>9,491</b>	<b>229</b>	<b>4,059</b>	<b>-1,011</b>
<b>Transfers</b>					
Funds allocated from government budget for financing of grants	353,460	339,865	317,409	309,729	257,783
Funds allocated from government agencies for financing of grants	158,431	150,459	143,103	111,489	128,269
Other funds received for financing of grants	92,664	89,621	66,412	60,411	48,465
Grants made	-604,555	-579,945	-526,925	-481,629	-434,516
<b>Outcome of transfers</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Changes to capital for year</b>	<b>-68,914</b>	<b>87,767</b>	<b>13,569</b>	<b>-14,261</b>	<b>21,750</b>

## Financial Statement per operational area

	Total	Education at first and second cycle			Research and education at third cycle	
		First and second level studies	Purchased education	Commissioned education	Research and doctoral studies	Commissioned research
<b>Operating revenues</b>						
Government grants	2,409,564	1,180,250	0	0	1,229,314	0
Revenues from tuition fees and other charges	670,376	278,007	9,882	16,400	236,009	130,078
Revenues from grants	1,878,724	71,505	0	0	1,807,219	0
Financial income	2,908	770	0	1	2,084	53
<b>Total operating revenues</b>	<b>4,961,571</b>	<b>1,530,532</b>	<b>9,882</b>	<b>16,400</b>	<b>3,274,626</b>	<b>130,131</b>
<b>Operating costs</b>						
Staff costs	3,027,200	867,492	2,649	5,953	2,097,122	53,983
Costs for premises	944,574	395,748	711	733	537,930	9,453
Other operational costs	845,588	249,156	6,512	8,848	520,719	60,351
Financial costs	4,754	1,344	0	38	3,327	45
Depreciation	210,442	60,641	0	2	138,660	11,140
<b>Total operating costs</b>	<b>5,032,557</b>	<b>1,574,382</b>	<b>9,873</b>	<b>15,574</b>	<b>3,297,757</b>	<b>134,972</b>
<b>Total operating outcome</b>	<b>-70,986</b>	<b>-43,850</b>	<b>9</b>	<b>827</b>	<b>-23,131</b>	<b>-4,841</b>
<b>Outcome from shares of subsidiary companies and other interests</b>	<b>2,072</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,072</b>	<b>0</b>
<b>Transfers</b>						
Funds allocated from government budget for financing of grants	353,460	2,190	0	0	351,270	0
Funds allocated from government agencies for financing of grants	158,431	30,263	0	0	128,169	0
Other funds received for financing of grants	92,664	1,897	0	0	90,767	0
Grants made	-604,555	-34,349	0	0	-570,206	0
<b>Outcome of transfers</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Changes to capital for year</b>	<b>-68,914</b>	<b>-43,850</b>	<b>9</b>	<b>827</b>	<b>-21,059</b>	<b>-4,841</b>



# Balance Sheet

	2019-12-31	2018-12-31
<b>ASSETS</b>		
<b>I. Intangible fixed assets</b>	<b>0</b>	<b>0</b>
Capitalised expenditure for development	0	0
Intellectual rights and other intangible assets	0	0
<b>II. Tangible fixed assets</b>	<b>710,139</b>	<b>704,779</b>
Improvements to non-owned real estate	293,325	246,493
Machines, inventory items, installation etc.	390,890	442,170
Construction in progress	25,924	13,250
Advance payments for tangible fixed assets	0	2,867
<b>III. Finansiella anläggningstillgångar</b>	<b>39,529</b>	<b>38,114</b>
Interests in wholly and partially owned companies	39,439	38,024
Other investments held as fixed assets	90	90
<b>VI. Receivables</b>	<b>136,343</b>	<b>153,108</b>
Receivables - costumers	32,133	38,679
Receivables - other government agencies	103,443	112,028
Other receivables	766	2,401
<b>VII. Cut of items</b>	<b>834,523</b>	<b>852,322</b>
Prepaid expenses	245,459	230,566
Accrued grant revenues	585,792	618,835
Other accrued revenues	3,272	2,920
<b>VIII. Settlement with Government</b>	<b>0</b>	<b>0</b>
Settlement with Government	0	0
<b>IX. Investments</b>	<b>12,000</b>	<b>0</b>
Other investments	12,000	0
<b>X. Cash and cash equivalents</b>	<b>1,476,074</b>	<b>1,579,513</b>
Balance and interest-bearing account at Swedish National Debt Office	1,413,205	1,347,069
Cash and cash equivalents	62,869	232,444
<b>TOTAL ASSETS</b>	<b>3,208,608</b>	<b>3,327,836</b>
<b>CAPITAL AND LIABILITIES</b>		
<b>I. Agency capital</b>	<b>797,572</b>	<b>867,130</b>
Government Capital	26,620	25,607
Outcome from shares of/in subsidiary companies and other interests	11,443	3,609
Changes to capital brought forward	828,423	750,147
Changes to capital according to Financial Statement	-68,914	87,767
<b>III. Provisions</b>	<b>71,550</b>	<b>39,883</b>
Provisions for pensions and similar commitments	12,246	11,885
Other provisions	59,304	27,997
<b>IV. Liabilities etc.</b>	<b>1,025,902</b>	<b>1,172,344</b>
Loans from Swedish National Debt Office	598,686	575,852
Accounts payable - other government agencies	102,280	102,576
Accounts payable - suppliers	135,642	136,762
Other accounts payable	188,175	357,154
Deposits	1,119	0
<b>V. Cut-off items</b>	<b>1,313,584</b>	<b>1,248,479</b>
Accrued expenses	88,583	91,991
Unutilised grants	1,198,537	1,130,835
Other prepaid revenues	26,464	25,654
<b>TOTAL CAPITAL AND LIABILITIES</b>	<b>3,208,608</b>	<b>3,327,836</b>
<b>CONTINGENT LIABILITIES</b>		
Government guarantees for loan and credits	none	none
Other contingents liabilities	none	none

