ETH ZURICH

Annual report 2011

ETH Zurich

“ETH Zurich can provide important, relevant knowledge – based on fundamental research – to inform contemporary debates in society.”

Ralph Eichler, President of ETH Zurich

ETH Zurich has come to symbolise excellent education, groundbreaking basic research and applied results that are beneficial for society as a whole. Founded in 1855, it today offers researchers an inspiring environment and students a comprehensive education as one of the leading international universities for technology and the natural sciences.

ETH Zurich has more than 17,000 students from approximately 80 countries, 3,700 of whom are doctoral students. More than 450 professors teach and conduct research in the areas of engineering, architecture, mathematics, natural sciences, system-oriented sciences, and management and social sciences. ETH Zurich regularly appears at the top of international rankings as one of the best universities in the world. 21 Nobel Laureates have studied, taught or conducted research at ETH Zurich, underlining the excellent reputation of the institute.

Transferring its knowledge to the private sector and society at large is one of ETH Zurich’s primary concerns. It has succeeded in this, as borne out by the 80 new patent applications each year and some 240 spin-off companies that were created out of the institute between 1996 and 2011. ETH Zurich helps to find sustainable solutions to global challenges. The focal points of its research include energy supply, risk management, developing the cities of the future, global food security and human health.

→ www.ethz.ch

Contents

Providing society with the relevant knowledge

The general population expects that a university which is funded mainly from the public purse will in fact serve society. Opinions vary about how this expectation should be met. Should a university make a contribution on current concerns in its own country? Or should it concentrate on the challenges facing global society? Or should its primary aim be to explore new scientific territory and in this way secure a competitive advantage for Switzerland in the long term?

No matter how we set our priorities, we certainly need outstanding employees to work on education, research and administration, and also committed and talented students. An attractive university like ETH Zurich is able to attract such people. This is reflected in our excellent positions in international university ranking lists, where ETH Zurich is the leading university outside the Anglo-Saxon system.

On this planet, food, water and energy are the essentials for maintaining a worthwhile life. ETH Zurich is committed to carrying out interdisciplinary work on all three. In Switzerland, the current debate is focusing especially on restructuring the energy system. Energy consumption in our country has increased steadily over the last 50 years and is three times as high today as it was in 1960. With the economic growth that we hope for, and immigration, it will increase yet more.

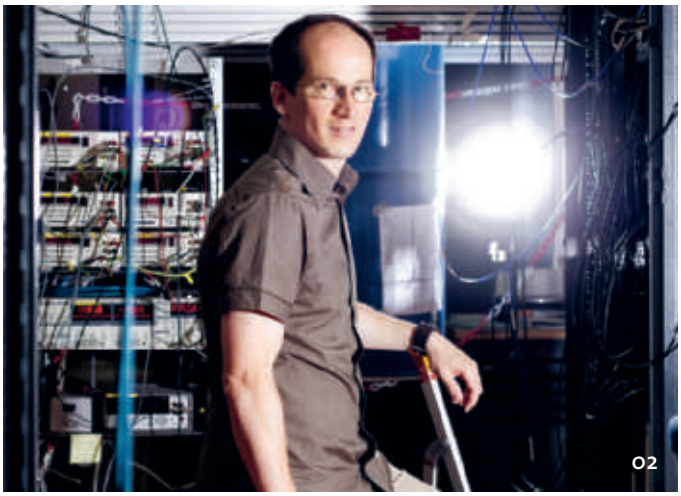
The public and politicians would like it if the link between energy consumption and economic growth could be broken. At the same time, they want to find a different source for 40 percent of the electricity production from nuclear power stations, and CO_2 emissions to be massively reduced – and all this while maintaining the same living standard. These tasks will take generations to accomplish and raise many technological, economic, political and social questions which must be answered in a democratic process. ETH Zurich can provide important, relevant knowledge to inform this debate, because it is researching efficient energy conversion technologies and implementing innovative processes on its own campus.

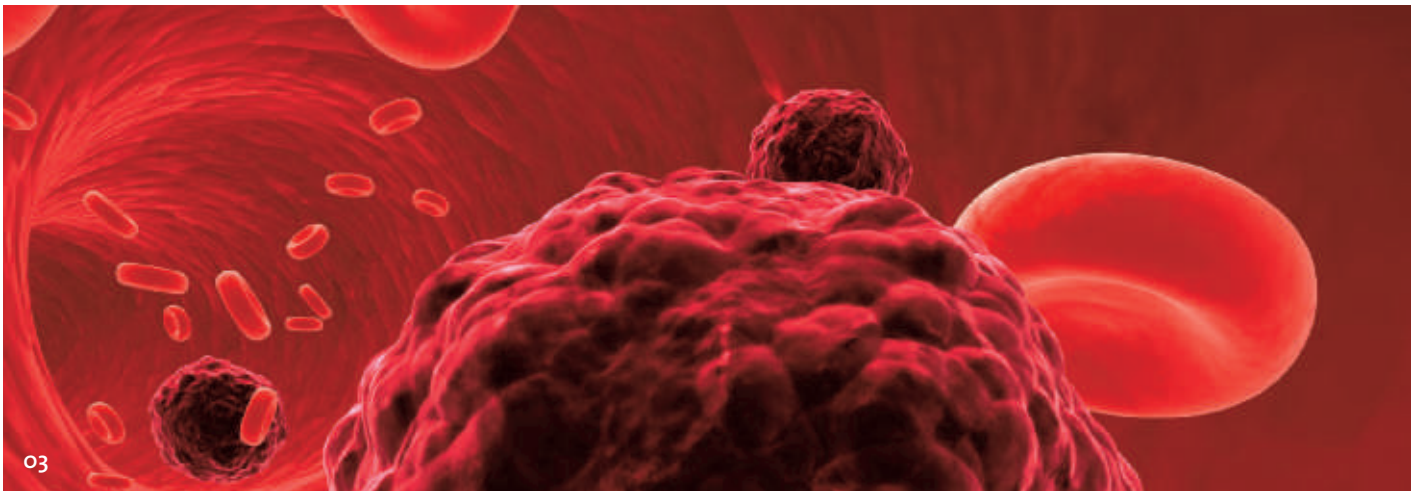
What is critical for the future success of ETH Zurich is stable financing. The biggest contributor is the federal government, whose basic funding covers 76 percent of the budget. However, this core funding also has to cover the indirect costs of secondary funding and the additional costs arising from rapidly increasing student numbers, and this sets a limit on third-party funding. Nevertheless, it continues to give us an important competitive advantage: it is thanks to this solid funding that researchers are also able to follow up ideas which may be outside the academic mainstream – a stimulating prospect for science!

R. Eichler

Ralph Eichler, President of ETH Zurich

Highlights 2011





01 – Contributing to the energy debate: in the Energy Talks, ETH researchers talk to well-known personalities from the worlds of business and politics, in the presence of Federal Councillor Doris Leuthard, about a sustainable future for energy. → Page 36

02 – Distinguished expertise in quantum science: the 2011 Max Rössler Prize, which is worth 200,000 Swiss francs, is presented to the young professor Andreas Wallraff for his outstanding research at the interface between information technology and quantum physics. → Page 58 ff

03 – Progress in cancer research: a biological computer network that is built into human cells can recognise and destroy cancerous cells. A new and highly accurate method of diagnosing prostate cancer also looks very promising. → Pages 19 and 20

04 – The fascination of research: on the weekend of 27/28 August 2011, over 15,000 visitors stream into the main buildings of ETH Zurich and the University of Zurich and discover the fascination of science for themselves at the "Scientifica" event. → Page 40

05 – Integrated risk research: in the newly opened "Risk Center", researchers from ETH Zurich are working with business to develop integrated approaches to researching and assessing the systemic global risks of the future. → Page 14

06 – DEZA anniversary: the Swiss Agency for Development and Cooperation (DEZA) celebrated its 50th anniversary in 2011. At ETH Zurich, the President of the Swiss Confederation Micheline Calmy-Rey highlights the long-standing close links between the university and DEZA. → Page 39

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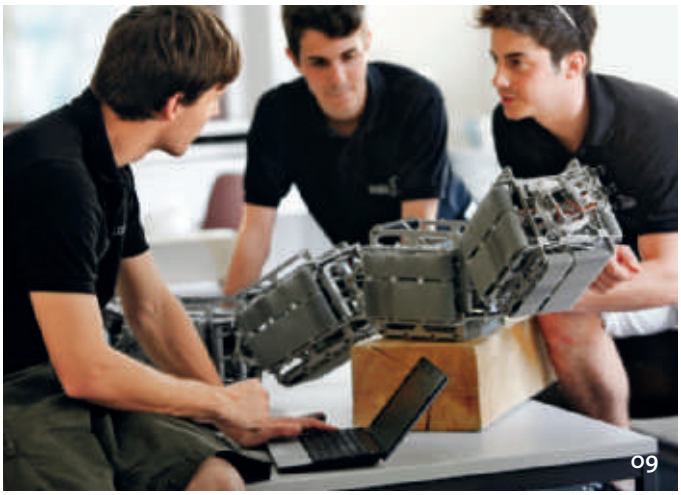
Highlights 2011



07 – Flying builders: in Orléans (F), an ETH team is demonstrating the world's first architectural installation to be built by flying robots: a six metre high model of a futuristic tower block. The show is attracting a great deal of international attention. → Page 21

08 – Successful spin-offs: in 2011, members of ETH found 22 new companies, thereby putting a great deal of expertise into practice. In the summer, the ETH spin-off Dacuda, one of the world's most innovative companies, successfully launches its scanner mouse on the market. → Page 23

09 – Theory and practice: focus projects offer budding engineers the opportunity to put their theoretical knowledge to practical use in a project of their own. The results are impressive – for example, the snake-like robot "Traloc". → Page 13

10 – The perfect partnership: ETH Zurich and the IBM Zurich Research Laboratory open a joint nanotechnology centre in Rüschlikon. The infrastructure here, which is unique in the world, includes a 950 m² cleanroom for micro- and nanoproduction. → Page 22

11 – Focus on global food supplies: with the founding of the new competence centre World Food System, ETH Zurich is setting a new focus for research. From l. to r.: Nina Buchmann, World Food System, Albert Kesseli, Mercator Schweiz Foundation, and ETH President Ralph Eichler. → Page 14

12 – Open Days in Basel: scientists at the Department of Biosystems Science and Engineering at the ETH campus in Basel open their doors and give interested members of the public an insight into their varied research work. → Page 40

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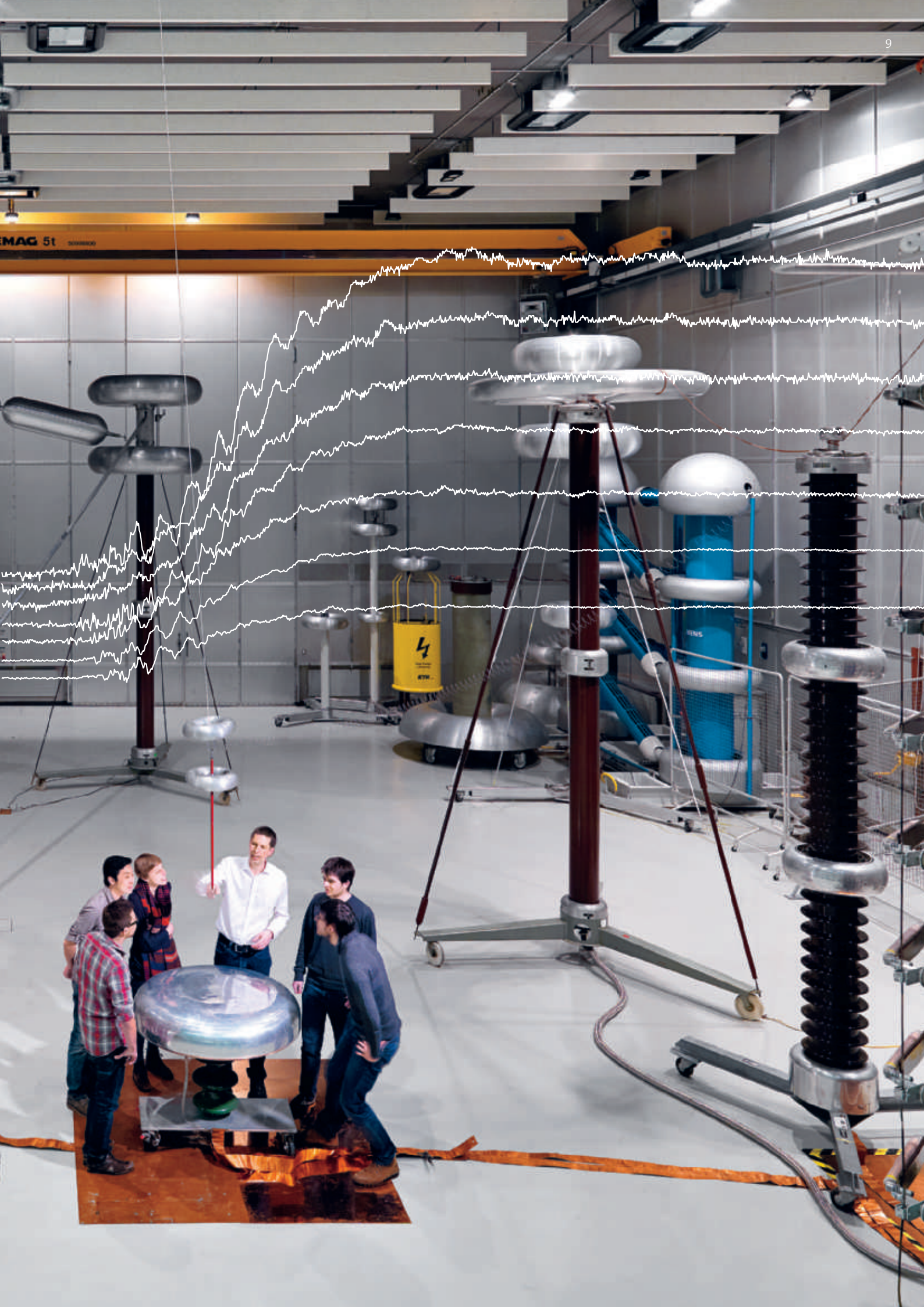
Core duties of ETH Zurich

Innovative tools maintain the outstanding quality of **education** despite the growing numbers of students. In its **research,** ETH Zurich is able to expand its activities thanks to private donations. The continuing cooperation with industry, and the founding of new spin-offs, ensure the **knowledge and technology transfer.**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Quality takes priority

ETH Zurich has so far succeeded in coping with the rapid increase in student numbers without sacrificing quality. It uses a number of tools to maintain a high standard of education and enable each particular course of study to continue to develop.

The number of students at ETH Zurich increased even more in 2011: 2560 men and women took up their Bachelor studies in the autumn, which is 4.6 percent more than in the previous year. As in previous years, the Mechanical Engineering and Architecture programmes saw the largest numbers of new entrants. Not far behind were Physics, Civil Engineering, Electrical Engineering and Computer Science. There was a pleasingly high demand for the new course in Health Sciences and Technology, which was introduced in preparation for the setting up of the new department of the same name (→ page 14).

Student numbers remain high at Master level. Like last year, once again in 2011 over 2600 students who had completed their Bachelor degree at a different university applied for admission to a Master programme at ETH Zurich. Of those, 85 percent came from abroad. Nearly 1000 of the applicants were accepted for the course after their applications had been checked, and about 600 of those who were accepted began a Master programme at ETH Zurich. ETH Zurich has seen a sharp increase in the number of doctoral students: by the end of 2011, 3700 young researchers had signed up to do a doctorate, a rise of more than 5 percent compared with the previous year. The total number of students in the autumn semester of 2011 had increased to over 17,100.

"We need more resources if we are to maintain the high standard of education."

Heidi Wunderli-Allenspach, Rector of ETH Zurich

Fine-tuning of the tools

The growing student numbers are bringing ETH Zurich ever closer to the limits of its capacity. Since the year 2000, the number of students has risen by over 60 percent, while the federal financial contribution to ETH Zurich has, when corrected for inflation, only increased by barely 10 percent over the same period. The university has taken a range of measures to cope with this discrepancy in growth over recent years. It is now clear to the Executive Board that all the options have been exhausted. In a concept paper addressed to the ETH Board, the Executive Board made clear in the autumn of 2011 that, if there is further growth in student numbers, the quality of the education provided can only be maintained with a substantial increase in funding (→ page 47).

In order to keep improving the quality of the education, ETH Zurich has established a system comprising various different tools. This system was reviewed in 2011. The individual processes were coordinated better. For example, surveys of graduates are now carried out in cooperation with the Swiss Federal Statistical Office every two years. This makes it easier to incorporate the feedback from our graduates into the future development of the courses. A pilot study was also carried out to revamp the system of course assessment by students. A new questionnaire is now being used which looks at the education and learning process as a whole and also covers examinations. Since good results were achieved with this, the new procedure is being gradually introduced. The Office for International Institutional Affairs has launched the "International Knowledge Base" in the interests of transparency. This summarises all the information about ETH's international relationships. This new tool is also intended to improve the basis for decision-making when it comes to admitting Master students.

Innovation and excellence

With the Rector's Innovedum Fund, ETH Zurich supports projects for bringing about lasting improvements in education and learning (→ page 13). In particular, support is given to initiatives for better coordination of learning objectives, teaching activities and examinations. New approaches to courses are also encouraged, as are initiatives to integrate research more closely in our teaching. New ideas affecting a whole course can be introduced through the system of "degree programme initiatives". Students are also being more closely involved in the development of their education: in the "Innovate Teaching!" competition which was held for the first time in 2011, they had the opportunity to put forward their ideas for improving the way they are taught.

The number of students at ETH Zurich increased again in 2011. By taking a number of improvement measures, it has been possible to cope with the rapid growth in recent years without sacrificing quality.

One of ETH Zurich's main priorities is to provide an environment in which outstanding students can flourish. The "Excellence Scholarship and Opportunity Programme" offers a performance-based grant to support particularly gifted students. Since the start of the programme in 2007, 114 students from all departments have benefited from a grant, with about a third of them being Swiss; 27 of them – including eleven women – were granted an award in September 2011. The sponsorship programme is truly international, as it has so far supported students from 29 different countries. The scheme is funded by private donors: in addition to well-known companies and foundations, about 800 alumni have also made a contribution.

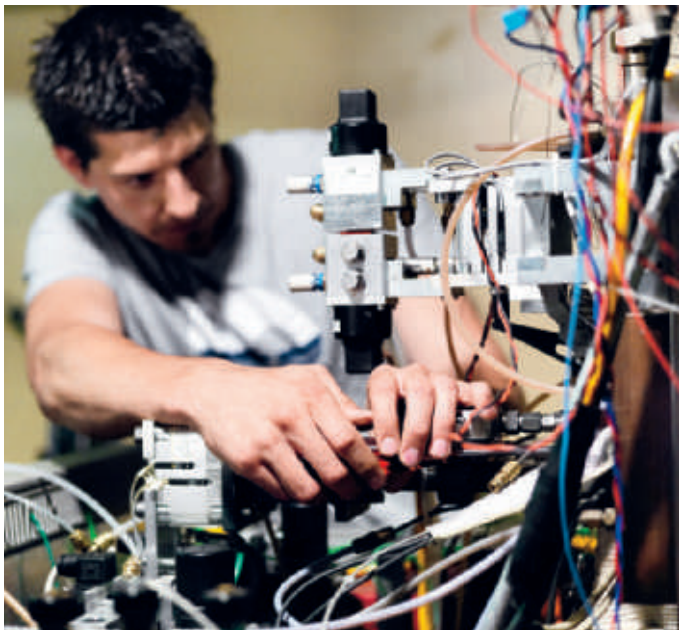
Sustainability in education

ETH Zurich pays particular attention to the subject of sustainability. Some of its courses deal specifically with topics related to sustainability. These include, for example, the Summer School run by ETH Sustainability, the central hub for coordinating sustainability activities at the university. From 26 June to 15 July, 30 students from 18 countries tackled the subjects of waste, green product design and material cycles, under the title "All Just Rubbish?" Young researchers had the opportunity to meet practitioners, stakeholders and the general public at the CCES Winter School "Sustainability Science Meets Practice". This was held for the first time in January and February 2011 in Einsiedeln and Männedorf. Seventeen doctoral students and post-docs took a critical look at the social implications of their work.

Popular Energy course

As part of its implementation of the Bologna Reform, ETH Zurich also introduced a number of specialised Master programmes which are run on an interdisciplinary, interdepartmental basis. These have been very popular with students, as shown by the "Master in Energy Science and Technology" (MEST) course. This has been running since 2007 under the auspices of the Energy Science Center and is taught by the Department of Information Technology and Electrical Engineering and the Department of Mechanical and Process Engineering. On the course, students gain a sound, broadly based knowledge of all kinds of energy-related topics – including power generation and distribution, renewable energies, transport systems, building technologies and industrial processes. They consider not only the technical aspects but also the economic, ecological and social factors. Admitting around 50 students a year, the MEST is now the most popular specialised Master programme at ETH Zurich. The rising number of applicants confirms that ETH Zurich has found a successful formula with its specialised programmes.

→ www.master-energy.ethz.ch



The Master in Energy Science and Technology course teaches theoretical principles and applied aspects of energy research.

Ten years of Bologna at ETH Zurich

In 2001, the Department of Information Technology and Electrical Engineering was the first department to switch from the previous diploma courses to the new Bachelor-Master system. This laid the foundations for the implementation of the Bologna Reform at ETH Zurich. Just one year later, Bachelor programmes were introduced for Mechanical and Process Engineering, Materials Science, Chemistry and Chemical Engineering, Human Movement Sciences and Sport and a course for Armed Forces Officers. Over the next few years, the other departments also implemented the reform. ETH Zurich now offers a total of 24 Bachelor programmes and 25 consecutive and 16 specialised Master programmes.

Converting all curricula to the new Europe-wide system of credit points, ECTS, was a big challenge for everyone concerned. ETH Zurich took this ambitious reform as an opportunity to overhaul its courses completely, in both structure and content. Most notably, it introduced a number of specialised programmes.

One important purpose of the European Bologna Reform was to facilitate mobility for students. Although demand for an exchange year or semester at ETH Zurich initially fell, in recent years it has picked up again (horizontal mobility). As for vertical mobility, over 90 percent of ETH Bachelor graduates continue their studies at ETH Zurich. On the other hand, there has been a sharp increase in the number of students with a Bachelor degree from a different university wishing to take a Master degree at ETH Zurich.

The introduction of Master programmes has led to an opening up of disciplines at ETH Zurich and greater "permeability" between courses (thematic mobility). This is not only due to the new, interdisciplinary courses but also applies to the consecutive Master programmes. It can be assumed that in the coming years the number of admissions to Master courses resulting from a change of discipline will continue to increase.

→ www.soc.ethz.ch

Theory and practice combined in education

With its focus projects, the Department of Mechanical and Process Engineering has developed a range of courses which combine theory and practice in a very special way. These focus projects, which have become quite well-known even outside ETH Zurich, offer budding engineers their first practical experience of problem-solving. Bachelor students in their fifth and sixth semesters have the opportunity, instead of attending lectures as normal, to run a project of their own. They can put the theoretical knowledge that they have acquired during their first years of study to practical use for the first time, and also learn some of the soft skills that will be so important in their later professional life. Starting from a product idea, the teams, with the help of students at different universities of applied sciences, go through all the processes of product development as if for real: concept development, drafting, design, simulation, engineering, production and marketing.

At the presentation of this year's focus projects in the ETH Main Building on 31 May 2011, the students once again demonstrated all kinds of clever projects, such as a base-jumping robot and a solar-powered sports car. The snake-like robot "Traloc" also attracted a lot of attention: this innovative device can move over uneven ground through rubble and ruins. It is intended for use in helping the rescue services to find missing people more quickly after an earthquake. The prototype developed by the students, which was presented to the general public to great acclaim at the "Scientifica" event (→ page 40), consists of five linked elements, which move forward on caterpillar tracks. The construction has been designed to withstand great stresses and strains, so that the robot can cross crevices and climb steps. "Traloc" can be controlled remotely from a safe position by a camera screen and a small model. During the project, the students had to develop a number of complex technical solutions: a joint to connect the separate parts that is both robust yet flexible, a powerful drive train and two different control concepts, to ensure that the snake-robot can be accurately steered towards its target.

The snake-like robot "Traloc" is designed to make it easier to find buried people after an earthquake.

Innovative approaches to education

In other departments, too, course units are directly connected to research. With the Rector's Innovedum Fund, ETH Zurich is specifically supporting this kind of approach. Exercises and laboratory work are designed as mini research projects, which cover the complete cycle from formulating the hypothesis to presenting the results. For example, at the Department of Environmental Sciences, students visited selected farms and performed an actual sustainability assessment, using innovative assessment tools. The results were presented directly at the farms and later put on the Wiki website for the course, so that other students could benefit from them.

→ www.ethz.ch/focus_projects

→ www.innovedum.ethz.ch/index_EN

Targeted expansion of research

Under the slogan "Sustainable Worlds", ETH Zurich would like to expand its work in the fields of energy, climate, sustainable building and global food supplies. As part of the thematic focal area "Complex Systems", the opening of the Risk Center paved the way for integrated research on risk.

In September, with the founding of the World Food System Competence Centre, ETH Zurich laid an important foundation for future research work. Thirty-one chairs from six departments at ETH Zurich and Eawag are involved in the World Food System project. The competence centre will work on the fundamental principles for sustainable agriculture, the production of high-quality food and stable supplies for a healthy world population. It will cooperate closely with the political and business communities, and institutions both in Switzerland and abroad. Thanks to support from private donors, it has already been possible to advertise for a new chair in the field of sustainable agroecosystems and a specific project fund has been set up. A chair in water economics is also to be created.

Expansion of work on energy and sustainable building

ETH Zurich has also been able to further strengthen its research effort on energy, not least thanks to support from industry. Following the creation of four new chairs in the field of energy technology in 2009 and 2010, in 2011 these were joined by two more chairs in electrical chemistry and electrical storage, based in the Department of Chemistry and Applied Biosciences.

At the ETH President's Conference in the middle of October 2011, ETH Zurich introduced another new initiative: the university intends to make sustainable building a higher priority in future. To that end, seven new chairs are being created in the departments of Architecture, Materials Science and Civil, Environmental and Geomatic Engineering. Three of these new chairs will be funded by ETH Zurich itself: one for each of digital fabrication, wood physics and construction technology. Four more chairs are to be established thanks to donations from private partners, and these will be in the fields of sustainable building, urban water systems, architecture and sustainable building technologies, and materials science for sustainable building.

"ETH Zurich charts a clear course in its research."

Roland Siegwart, Vice President Research and Corporate Relations

Integrated study of systemic risks

On 23 June, on the occasion of the international workshop on "Coping with Crises in Complex Socio-Economic Systems", the ETH Risk Center was officially opened. In this new competence centre, researchers from ETH are working with business to develop new and integrated approaches to researching and assessing the systemic global risks of the future. Natural scientists, engineers and social science experts will be combining their specialist research in order to take a holistic approach to considering and modelling risk, and will develop proposals for increasing the resistance of social systems. The competence centre enjoys broad institutional support and brings together ten founding chairs from five departments. Private donations have helped here, too, with setting up three new chairs and some of the strategic research projects.

Strengthening medical technology

Another important area for research is medical technology. ETH Zurich already has wide-ranging expertise in this field. This is now to be expanded under the MedTech initiative, with the creation of six more chairs. Thanks to contributions from the private sector, some of them have already been set up. Medical technology is also a key part of the new Department of Health Sciences and Technology, which will come into being in 2012 and will also include the areas of Human Movement Sciences and Sport, Food Sciences and Nutrition and Neurosciences. In 2011, the relevant chairs identified a number of priorities which they intend to address over the next four years. Top of the list are the following areas: biomaterials in medicine, health in old age, individualized food and nutrition, biomechanics and regenerative technologies, and neuronal control, plasticity and rehabilitation.

Successful partnerships at home and abroad

ETH Zurich also has successes to report on the international stage. As part of the 7th European Research Framework Programme, the EU called for flagship initiatives on Future and

ETH Zurich has extensive expertise in medical technology. For example, ETH engineers played a key role in developing the therapy robot ARMin which is used in the rehabilitation of stroke patients.

Emerging Technologies. The six most promising projects were announced in March 2011; they include two projects in which ETH Zurich is acting as co-leader: FuturICT and Guardian Angels. Researchers at ETH Zurich have also again been very successful in obtaining the sought-after grants from the European Research Council: five scientists were awarded an ERC Starting Grant and seven more an ERC Advanced Grant. Lastly, in spring 2011, six young researchers received grants for an SNSF-funded professorship at ETH Zurich. There has been a change to the ETH Zurich postdoctoral fellowships which are awarded to about 24 postdocs each year. Until 2014, the scheme will be 40 percent funded by the EU under COFUND.

Finally, research can also be given a new stimulus by entering into specific partnerships: for example, on 17 May, ETH Zurich and the IBM Zurich Research Laboratory opened a joint nanotechnology centre in Rüschlikon. Meanwhile at the "BeingThere Centre", which has received funding worth 18 million US dollars, ETH Zurich is working with Nanyang Technological University in Singapore and the University of North Carolina at Chapel Hill to explore entirely new concepts and technologies in telepresence. The ETH Institute for Visual Computing will be concentrating on developing a robotised mobile displays which can create the illusion that someone is present in the room.

→ www.ethz.ch/world_food_system
→ www.riskcenter.ethz.ch
→ www.hest.ethz.ch/index_EN
→ www.cs.unc.edu/cms/research/research-groups/being-there

Presenting new climate scenarios

It is expected to become significantly warmer in Switzerland as a result of climate change, and drier in summer. That was what new climate scenarios showed which were presented by researchers from ETH Zurich and MeteoSwiss in their report called "Swiss Climate Change Scenarios", published in September 2011.

The new results are largely in line with the scenarios previously published in the report by the OcCC (Advisory Body on Climate Change) in 2007. That presented the main findings from the 4th Assessment Report by the IPCC (Intergovernmental Panel on Climate Change) and their implications for Switzerland. In the 2011 report, the difference is that the researchers were able to use new climate simulations and improved statistical processes. These were particularly useful in assessing and quantifying the uncertainties more accurately.

For example, the 2007 report was based on models with a resolution of 50 to 100 km. Now the researchers were able to include data from models with a grid cell size of just 25 km. They also differentiate in the latest report between three different emissions scenarios – including a new, so-called "intervention scenario", which would require global greenhouse gas emissions to be halved by 2050. This enabled the researchers to show for the first time how global climate policy will affect the climate in Switzerland.

Heatwaves and more rain

It appears that in Switzerland the effects of heatwaves and drought will be felt most strongly in the Ticino. These scenarios continue to show significant changes in precipitation, with rain increasing at the expense of snowfall. Especially in the second half of the century, the forecasts suggest that climate change will become obvious in more and more climate variables such as average temperatures and precipitation. Even if efforts to cut global greenhouse gas emissions by 2050 by half compared with the year 2000 were successful, the climate in Switzerland will have already become 1.2 to 1.8 degrees Celsius warmer than it was between 1980 and 2009.

For their detailed simulations – which took 20 weeks and produced 9.5 terabytes of data – the scientists used the supercomputers at the CSCS, the Swiss National Supercomputing Centre.

The climate researchers are also working with the specialists at the CSCS on the HP2C project (High Performance and High Productivity Computing). Thanks to this partnership, the Swiss team is now one of the first groups of climate researchers in the world to adapt its computer codes and algorithms to the computer architecture of the future.

For the new report on "Swiss Climate Change Scenarios", researchers also took part from the Center for Climate Systems Modeling (C2SM), a research institution based at ETH Zurich in which not only ETH and MeteoSwiss are involved but also the research Institutes Empa and Agroscope Reckenholz-Tänikon (ART). Other partners who contributed to the report include the National Centre of Competence in Research on Climate (NCCR Climate) and the Advisory Body on Climate Change (OcCC).

Prospects not looking good for melting glaciers: according to the latest climate scenarios, it is due to get warmer in Switzerland.

→ www.ch2011.ch/en

Fuel from water, CO_2 and sunlight

A research team from ETH Zurich, the Paul Scherrer Institute (PSI) and the California Institute of Technology has succeeded in producing solar fuels from water and carbon dioxide. The researchers have developed an innovative reactor in which concentrated solar radiation drives a fast and stable thermochemical process which converts water (H_2O) and carbon dioxide (CO_2) into a mixture of hydrogen (H_2) and carbon monoxide (CO). This "Syngas" is a precursor for liquid fuels.

The reactor consists of a cavity receiver which contains a porous, monolithic cerium oxide cylinder. The concentrated solar energy has a radiation intensity equivalent to 1500 suns and is directly and efficiently absorbed by the cerium oxide. In the first step of the two-stage chemical process, the cerium oxide, with the help of concentrated solar radiation at a temperature of 1500 degrees Celsius, releases oxygen atoms from the structure. In the second step, the material is allowed to react with water vapour and CO_2 at about 900 degrees Celsius. This breaks up the water and CO_2 molecules. The released oxygen atoms are absorbed into the material structure of the cerium oxide in such a way that it reverts to its original form and the process can begin again. What is left is the required "Syngas".

The efficiency factor for converting solar energy into fuel in a 2 kW prototype reactor was 0.8 percent. Thermodynamic analysis shows that efficiency factors of up to 19 percent could be achieved. Now the research team led by Aldo Steinfeld, Professor of Renewable Energy Carriers at ETH Zurich and Head of the Solar Technology Laboratory at PSI, is using numerical fluid mechanics and heat transfer simulations to optimise the solar reactor so that it can be deployed on a large, megawatt scale, in solar tower installations.

The innovative reactor uses concentrated solar radiation to generate fuel from water and carbon dioxide.

Aldo Steinfeld received the "Golden Idea Award" from the Swiss Society for Ideas and Innovation Management, "Idée Suisse", in 2011 for his ground-breaking development of the innovative reactor.

→ www.pre.ethz.ch

New transistors developed

Researchers led by ETH Professor Colombo Bolognesi and their French colleagues have succeeded in miniaturising power electronics even further. For the first time, they have made high-speed transistors out of gallium nitride, grown on a substrate of (110)-silicon. These transistors are compatible with everyday metal oxide semiconductor chips (CMOS), which are based on silicon with the same crystal orientation.

Until now, gallium nitride could only be used on sapphire or silicon carbide as the carrier material. That is considerably more expensive than pure silicon and also only allows smaller substrate wafers to be produced.

With this new method of production, not only does the gallium nitride technology become more profitable, but it may also be possible to use it to develop transistors which are faster, more heat-resistant and more energy-efficient. Gallium nitride can withstand temperatures of up to 1000 degrees Celsius, which makes the material of interest in building sensors in car engines, for example. The researchers also demonstrated that gallium nitride-silicon transistors allow frequencies up to 205 gigahertz. That is more than enough to make mobile phones, computers and power electronics faster, more economical and smaller.

→ www.mwe.ee.ethz.ch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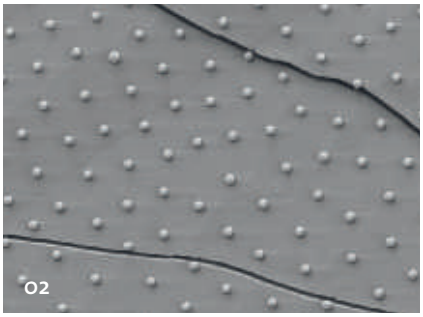
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Genetic network controlled by light 01

Researchers led by ETH Professor Martin Fussenegger from the Department of Biosystems Science and Engineering (D-BSSE) have constructed a biological circuit in human cells which allows genes to be deliberately switched on and regulated by blue light. This causes them to produce a hormone which can control insulin production and bring blood sugar levels back into balance. This "gene light switch" could therefore lead to treatments which could be used for Type 2 diabetes, for example.

The sensor that the scientists use to switch on the network is made of melanopsin, a protein occurring naturally in the retina of the human eye which changes shape under blue light. This normally triggers a signal cascade which controls circadian day/night rhythms. However, the scientists have now changed the connections in this process: they use a signal path which plays an important role in immunoregulation.

As a result, under blue light the hormone GLP-1 is produced, which stimulates insulin production in a similar way to some diabetes drugs. The method has already worked successfully in diabetic mice. Martin Fussenegger believes that in future GLP-1 gene therapy may be able to replace the traditional need for diabetics to inject insulin.

→ www.bsse.ethz.ch/research

New opportunities in materials research 02

ETH scientists have succeeded in solving one of the key problems in materials research. They have combined a procedure used in biology – what is called the freeze etching technique – with electron microscopy in order to be able to measure directly for the first time the wetting properties of individual nanoparticles, that is to say particles up to 5000 times smaller than the diameter of a human hair. Specifically, they have measured the contact angle of a particle measuring only 10 nm at the interface between two liquids. Knowing this contact angle is essential in the manufacture of new materials, for example lotions or creams – that is to say emulsions in which oil and water are processed together. This is because from the contact angle scientists are able to work out the properties of the nanoparticle and the structure of the material, so as to be able to produce materials which have exactly the required properties.

In their research, the materials scientists bring an oily phase and an aqueous phase into contact. They apply hydrophilic and oleophilic nanoparticles to this liquid interface. The deeper the particles sink into the water, the smaller the contact angle. With the help of the electron microscope, it is now possible to measure this angle directly for particles up to 100 times smaller.

→ www.surface.mat.ethz.ch

Using electricity against bacteria 03

Thanks to a new method, dentists will soon have an effective way of fighting harmful bacteria on dental implants – by using electricity. Just a few milliamperes, which patients will either not notice at all, or only as a slight muscle contraction, depending on their sensitivity and the strength of the current, are enough to kill the bacteria. This has been shown in experiments carried out by Dirk Mohn as part of his doctoral thesis with ETH Professor Wendelin Stark of the Institute for Chemical and Bioengineering, in cooperation with Thomas Imfeld, Professor at the Centre for Dental Medicine at the University of Zurich.

Over the last ten years, the number of dental implants used in Europe and the USA has doubled. About 10 percent of patients experience problems, mainly in the first year after the intervention: either the implant does not settle in the bone at all, or the surrounding tissue becomes infected. Ultimately, an infection can lead to atrophy of the bone and to the implant having to be removed again.

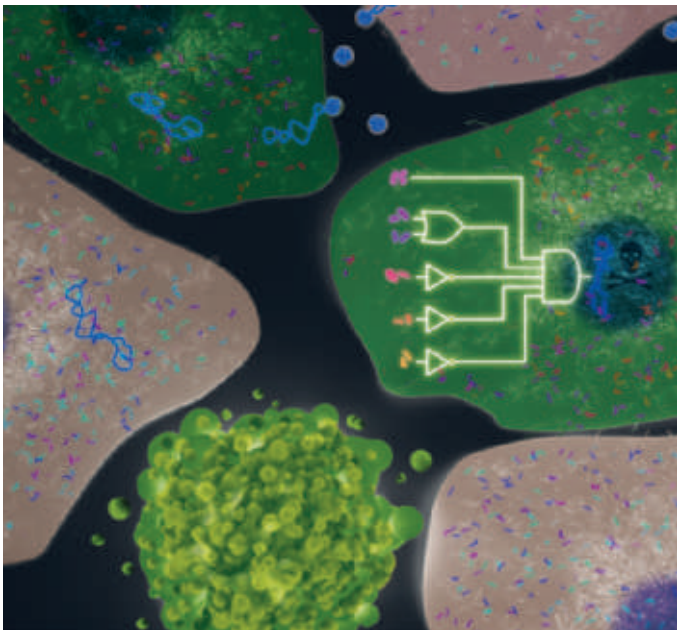
The aim of the researchers was to develop a non-invasive procedure for treating this kind of infection efficiently and gently.

→ www.fml.ethz.ch

“Bio-computers” fight cancer cells

Researchers have succeeded in inserting a biological computer network in human cells which is able to recognise and destroy cancer cells. Yaakov Benenson, Professor of Synthetic Biology at ETH Zurich, and his research colleague Ron Weiss from the Massachusetts Institute of Technology have developed a circuit consisting of a number of genes whose task is to gather health-related information inside a human cell and then also initiate treatment. The idea is that the “bio-computer” will be able to distinguish between cancerous cells and healthy cells and cause degenerated cells to die. It takes action if five cancer-specific factors are present in sufficient concentration inside the cell.

The researchers tested the gene network in cancer cells taken from the cervix and in healthy cells. First of all they had to find out which combination of signalling molecules is sufficiently specific to cancerous cells to avoid the destruction of healthy cells. The difficult thing about this was that there are about 250 different cell types in the human body and countless different variations of cancer cells. The cell computer that has now been developed can link five factors together and make the correct diagnosis from them. This is an important step towards finding an effective treatment method for cancer patients. Benenson’s experiment is the first of its kind in living cells.



The circuitry of the cell computer. If five cancer-specific factors match, the cell is destroyed.

In the next stage, he wants to test the cell computer in a suitable animal model.

→ www.bsse.ethz.ch/synbio

Hope for diabetics

A research team working with Roche has discovered a previously unknown mechanism which has a negative effect on the insulin-producing beta cells. They have succeeded in inhibiting this and so stimulating the beta cells to multiply. This could be a way of fighting diabetes.

What plays a critical role in this is the enzyme Bace2. Unlike its close relative Bace1 – the protease which plays a role in Alzheimer’s disease – all that was previously known about Bace2 was that it does not contribute to that disease because it is barely present in nerve cells.

Now scientists led by ETH Professor Markus Stoffel have found out that Bace2 occurs mainly in the insulin-producing beta cells in the pancreas and inhibits the division of that type of cell there, which ultimately reduces insulin production. As a result, sugar absorption in the cells is disrupted, leading to diabetes.

Like Bace1, Bace2 is also a cutting tool – what is called a membrane protease. It is embedded in the membrane and cuts the molecules of the cell surface, so rendering them inactive. The research group found that probably the most important substrate for Bace2 was the growth-stimulating protein Tmem27. If there is less of this because of the activity of Bace2, the beta cells can only reproduce more slowly or not at all. That is to say, the more inactive Bace2, the more rapidly the beta cells divide.

Indeed, in genetically modified mice, with no active Bace2, the researchers found more Tmem27 in the membranes of the beta cells. The mice also had more beta cells which produced more insulin.

At the same time, the scientists also found a way of inhibiting active Bace2. In Roche’s substance reference library, they discovered a specific inhibitor for this protease. They administered this substance to diabetic mice, whereupon the beta cells multiplied and the animals’ sugar balance improved – an indication that the newly created cells were indeed producing insulin. Since Bace2 and Tmem27 also occur in human beta cells, it is possible that diabetics may also one day be able to benefit from Bace2 inhibition.

→ www.imsb.ethz.ch

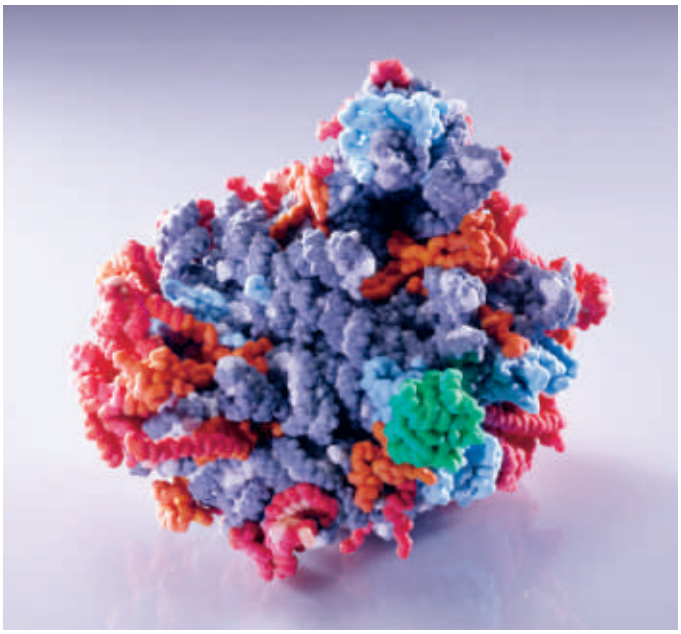
Central enzyme complex decoded in detail

Researchers led by Nenad Ban, Professor of Structural Molecular Biology at ETH Zurich, have decoded the structure of the larger of the two sub-units of the ribosome of higher organisms. This will not only enable scientists to understand the function of this cellular "protein factory" better, but also to develop new drugs such as antibiotics.

The cellular machine which reads genetic information piece by piece and produces proteins on the basis of that information – what is called the ribosome – is one of the most complex enzymes occurring in biology. It consists of two sub-units which in their turn are made up of several dozen proteins and other molecules. One year ago, Nenad Ban and his team decoded the three-dimensional structure of the smaller of the two sub-units in a higher organism, the so-called 40S sub-unit. Now they have gone one better and published the structure of the larger 60S sub-unit.

The researchers examined this structure in the single-cell ciliate Tetrahymena thermophila. This enabled the researchers to decode for the first time the structure of the large ribosome sub-unit of a higher organism. This group of organisms includes fungi, plants and animals. The ribosome sub-unit of the ciliate is similar to that of other higher organisms, including that of man.

→ www.mol.biol.ethz.ch



Decoded for the first time by ETH researchers: the sub-unit of a ribosome of a higher organism.

Accurate cancer diagnosis

In a five-year research project, an interdisciplinary group of scientists from ETH Zurich, the University Hospital Zurich and the Cantonal Hospital of St. Gallen has developed a highly accurate method of diagnosing prostate cancer. If the new method proves to be effective in further clinical tests, this would be an enormous step forward. The present methods of diagnosing prostate cancer, by detecting tumour antigens in the blood, often deliver incorrect results. That is not only expensive – patients sometimes have to undergo painful and unnecessary biopsies. Only then can a reliable diagnosis be made. Through their work, the researchers have discovered a generally applicable method of identifying what are called biomarkers, i.e. characteristic, objectively measurable features, such as proteins, which can be indicators of a pathological process in the body. It would also be possible to diagnose other types of cancer early because the pattern of proteins in the affected organ changes when the cancer begins. Since about 20 percent of the surface proteins of certain tissues, such as the prostate, break off and can be detected in the blood serum, recognising this kind of protein pattern that is specific to the disease is a reliable method of diagnosis. The relevant biomarker pattern also contains information about the type of tumour, enabling more customised patient treatment.

Scientists have been using all kinds of high-tech methods for years to try to identify biomarkers which clearly indicate the presence of cancer. With the help of a list of specific prostate proteins, created using a mouse model, the research team identified 39 matching proteins in humans. From those, computer scientists worked out which four proteins would produce the most reliable diagnosis. Using this biomarker pattern, the scientists then investigated a group of patients whose blood had never been analysed before – and they were able to say accurately, consistently and reproducibly whether they were suffering from prostate cancer.

The process is now to be tested in larger clinical studies. This promising project will be further developed in future by the ETH spin-off company Proteomedix AG, which is currently working on a diagnostic kit.

→ www.cell.biol.ethz.ch
→ www.ccspmd.ethz.ch
→ www.proteomedix.ch

Robots build futuristic tower block

At the end of 2011, a group of scientists led by Fabio Gramazio and Matthias Kohler from the Chair of Architecture and Digital Fabrication, together with Raffaello D'Andrea, Professor at the Institute for Dynamic Systems and Control, attracted a lot of attention with their installation at the Fond régional d'art contemporain (Frac) Centre in Orléans: in the exhibition hall, the ETH team demonstrated the world's first ever architectural installation to be built by flying robots. During a performance which lasted for twelve hours, spread over three days, visitors were able to watch how the "quadrocopters", flying autonomously, built a six metre high structure out of 1500 foam bricks. The project, called "Flight Assembled Architecture", represents an architectural vision which, on an urban scale, over 600 metres high, would provide living space for over 30,000 inhabitants – a glimpse of the housing structures of the future. The performance in Orléans was preceded by several years of preparation. For example, the flying robots had to be painstakingly "taught" how to place the individual building components in their intended positions in a confined space, without colliding into one another.

→ www.ethz.ch/quadro

The ETH team in Orléans built a model of a futuristic tower block using free-flying robots.

Observing electrons in a molecule

Hans Jakob Wörner from the Laboratory of Physical Chemistry at ETH Zurich, together with researchers from France and Canada, has succeeded for the first time in fully visualising the movement of electrons during a chemical reaction. The findings from the experiment are fundamental for photochemistry and may help to make solar cells more efficient or, one day, make artificial photosynthesis possible.

The scientists irradiated nitrogen dioxide (NO_2) with a very short ultraviolet laser pulse. The molecule takes up the energy contained in the pulse and sets the electrons in motion. They then begin to rearrange themselves, meaning that for a short time the electron cloud may occur in two different shapes. Then the molecule begins to oscillate and finally breaks down into nitrogen monoxide and one oxygen atom.

Wörner and his colleagues used a second laser pulse to remove one electron from the NO_2, accelerate it and return it to the molecule. The electron emits light in the form of an attosecond pulse (1 attosecond = 10^{-18} seconds), which can be measured to provide detailed information about the electron distribution and how it changes over time. This information reveals details about chemical reaction mechanisms which could previously not be detected. The experiment helps scientists to improve their understanding of fundamental processes in molecules and is an ideal extension of computer simulations of photochemical processes.

What is interesting is that in the NO_2 molecule two states of the electrons can have the same energy – this is referred to as conical intersection. This is central to photochemistry and often occurs in nature during chemical processes induced by light. It then functions as a kind of rocker switch: for example, if light falls on the retina, the electrons there begin to move and the molecules of the retina "flip", which ultimately converts the information from the light into electrical information for the brain. What is special about conical intersection is that the electron movement changes very efficiently into atom movement.

→ www.atto.ethz.ch

Successful partnerships with industry

ETH Zurich has further expanded its relationships with industry. It entered into an excellent example of a public-private partnership when it set up a new research centre for nanotechnology in Rüschlikon.

On 18 May 2011, in the presence of Federal Councillor Didier Burkhalter and 600 other invited guests from the worlds of science, business and politics, IBM Research Zurich and ETH Zurich opened the "Binnig and Rohrer Nanotechnology Center" in Rüschlikon. The new research centre provides state-of-the-art facilities for carrying out research, in an area covering about 6500 m². At its heart is a 950 m² cleanroom for micro- and nano-production. There are also noise-free labs for making extremely sensitive measurements. ETH Zurich has three research groups installed in the new centre for at least the next ten years.

Closer cooperation

The new centre is an excellent example of public-private partnership: it enables the two partners not only to extend their infrastructure but also to cooperate even more closely. The scientists are working, for example, on innovative switching elements for computer processors and memories, and researching materials which would make it possible to construct more energy-saving computers. Also on the research agenda are micro- and nano-systems, carbon-based electronic components, functional materials and optical data communication.

ETH Zurich also maintains very close contacts with industry within the scope of its strategic initiatives. In close cooperation with the ETH Zurich Foundation, ETH Zurich is hoping with these initiatives to attract more companies, institutions and private donors as partners, in order to speed up development of specific areas of research. For some initiatives, Partnership Councils have now been set up, to strengthen the contact between the ETH researchers and the partner companies that are involved. The first meetings of these councils took place in the autumn for the World Food System and Integrative Risk Management initiatives; for the Electrical Energy initiative, the Partnership Council has already met several times to exchange ideas.

Support for young entrepreneurs

One important element in the transfer of knowledge and technology into practice is still the spin-off companies which are spawned by ETH Zurich. Once again in 2011, a pleasing number of companies were set up. Of the total of 22 new spin-offs, five companies are in the information and communications technology sector, seven in the service or consultancy sector, three in mechanical engineering and two each in medical devices and electrical engineering. This means that over the last five years, 110 new companies have been set up by ETH researchers.

In order to provide even more assistance to students and researchers on the way to establishing their own company, ETH Zurich has created the funding scheme "Pioneer Fellowships". This is intended to speed up the conversion of new findings from fundamental research into marketable ideas. It is aimed at young scientists with entrepreneurial spirit who have made potentially interesting findings but feel they are not yet quite ready to be put into practice. Until now there has been no funding mechanism for bridging this gap. During 2010, a total of five project ideas received help, and in 2011 seven scientists were awarded a grant. This support enables the researchers to spend the next 18 months firming up their ideas. After initially being funded by ETH Zurich, it is hoped that this type of support for young talent will also be funded by private donations in the long-term.

ETH Zurich not only supports young entrepreneurs with setting up their companies, it also wants to help them network more easily. So in September, the university invited all the spin-off companies and Pioneer Fellows to a "Homecoming Day" at their alma mater. While 80 companies had taken part in the first event the previous year, in 2011 no fewer than 130 founders of spin-off companies came to share their experiences with their colleagues.

→ www.transfer.ethz.ch

Perfect example of a successful public-private partnership: in May, ETH Zurich and IBM Research Zurich opened a joint research centre for nanotechnology in Rüschlikon which will enable research to be carried out at the very limits of what is technically feasible.

Successful ETH spin-offs

In August, Federal Councillor Johann Schneider-Ammann awarded the first three CTI Innovation Vouchers for Life Sciences, to provide financial support for start-up companies and SMEs. Two of the three companies receiving the awards came from the ETH Zurich environment: the spin-off company Philochem develops innovative ways of manufacturing antibody-based drugs for cancer treatment, while the company Compliant Concept, a start-up from ETH Zurich and Empa, is developing a new type of bed which automatically shifts the patient's position.

The European innovation platform "Science Business" presented its "Academic Enterprise Awards Europe" for the third time. Two of the five ACES awards went to the ETH spin-offs Mirasense and Dybuster. Mirasense has developed an application for mobile phones which scans the barcodes on products and provides additional information within seconds. Dybuster is developing a treatment software to improve the spelling performance of dyslexics.

The spin-off company Dacuda reached an important milestone: this young company has signed a multi-year contract with LG Electronics. In summer 2011, the electronics giant launched Dacuda's scanner mouse and now wants to develop a complete product family based on this technology.

The sale of the spin-off company Procedural, which develops software for the 3D animation of buildings and towns, must also be counted as a success. By buying Procedural, the California-based software giant ESRI (Environmental Systems Research Institute) wants to make Zurich a leading headquarters for research and development in the fields of Urban Design and 3D visualisation.

ETH Zurich as an enterprise

ETH Zurich is putting up new buildings to meet the growing demands being placed on its **infrastructure and staff.** Increasing levels of third-party funding call for long-term solutions with regard to **finance and controlling.** A **responsible use of resources** is not only good for the environment but also leads to financial savings.

Creating more space on the main campuses

ETH Zurich has grown rapidly in the last few years. This means that the demand for space has increased accordingly. The university aims to alleviate the problem by constructing various new buildings on its two main campuses, in the city centre and on the Hönggerberg.

The continuing growth of ETH Zurich is reflected in the demand for new facilities and the way new construction for the university is being planned. Over the next few years, and in accordance with its strategy for 2012–2016, ETH Zurich will be investing about a billion Swiss francs in its buildings, in order to meet the urgent need for repairs and additional space. In general, ETH Zurich is assuming in its long-term financial planning that it will devote about 15 percent of its budget to investing in its buildings.

New buildings on the city-centre campus

AETH Zurich is constructing two new buildings to create additional space on its city-centre campus: an impressive new building with workstations for 400 people is currently being erected on Leonhardstrasse and this will be ready for occupation from 2014. Meanwhile on Gloriastrasse ETH Zurich is putting up another new building, in place of the present Laboratory of Hydraulics, Hydrology and Glaciology (VAW), which will house parts of the new Department of Health Sciences and Technology in future. A decision was reached on the design of the new building in April: the "Ammonite" project put forward by the Zurich-based architects Boltshauser Architekten won through in preference to its rivals, not least because of its sustainable design features. The new building will offer 10,000 square metres of usable space to be used for various types of laboratory, technology platforms, offices and seminar rooms, creating space for at least ten full professorships. Preparatory work on this new building is due to begin in autumn 2013. Construction is being partly funded by a donation from a private foundation.

The two new buildings on Leonhardstrasse and Gloriastrasse represent an important part of the planned development of the university district in Zurich city centre. The relevant part of the cantonal structure plan was produced on the basis of the master plan dating from 2005/06, which defined the key principles governing how ETH Zurich, the University of Zurich and the University Hospital Zurich should develop over the next 25 years. As part of this development planning, ETH Zurich promised the city that it would release residential accommodation that it is currently using as office space. Altogether, the university plans to make 7500 square metres of floor space available for use as apartments again.

Additional space on the Hönggerberg

ETH Zurich is also creating additional space on the Hönggerberg campus: by the start of the 2012 autumn semester, the first stage of the new HCP building will have been constructed by a full-service contractor on a site south of the HCI building, thanks to funding from the ETH Zurich Foundation. The new building will provide about 1000 m² of office space, 450 m² of teaching accommodation and a further 450 m² of study space for students. Work on the second stage of the project, to provide a further 2600 m² of main usable space, will begin immediately afterwards. This new building will enable ETH Zurich to return expensive laboratory space that is currently being used for offices because of the shortage of capacity to its original purpose.

There is also a massive shortfall in the accommodation available for students. To try to overcome the acute housing shortage in the Zurich area, the Zurich Student Housing Foundation (SSWZ) is carrying out its own construction projects at a number of locations in the city. At the beginning of September, the Foundation opened two new student residences on Bächlerstrasse in Zurich-Affoltern. Together, they provide accommodation for 179 students. The two student residences HWO and HWW, which ETH Zurich is to build in partnership with the SSWZ and private investors on the Hönggerberg campus, have also moved a step nearer to realisation. They should create accommodation for a total of 1000 students. Details of the HWO project have been submitted to the ETH Board for inclusion in the 2013 building programme; as for the HWW project, 2011 saw the

"ETH Zurich is committed to creating an attractive university district."

Roman Boutellier, Vice President Human Resources and Infrastructure

The growth of the university has implications for buildings planning. On Gloriastrasse on the city-centre site, ETH Zurich is planning an impressive new building to house parts of the new Department of Health Sciences and Technology.

completion of the pre-qualifying stages of the investor competition that will be held in 2012.

New education and research centre in Lindau

ETH Zurich is entering new territory at its Lindau-Eschikon site: together with the Vetsuisse faculty of the University of Zurich and the Strickhof Cantonal Centre of Competence in Agriculture and Nutrition, it plans to set up a joint education and research centre called Agrovet-Strickhof which will be of national and international importance. If everything goes according to plan, the centre will begin its work in stages starting in 2014. At the end of September 2011, the Executive Council of the Canton of Zurich approved the planning application for the required new buildings at Strickhof. The competition to appoint the general planning company was announced in December 2011.

The three partners hope to work closely together on various projects at the interface between agricultural science, veterinary science and farming in practice. ETH Zurich wants to set up a centre in Lindau for studying the metabolism, where scientists will research, among other things, how livestock can be reared more efficiently and with fewer emissions. The physical proximity of the various partners creates a unique opportunity to study the entire food chain, from plants through animals to humans. This means that the new Agrovet-Strickhof centre fits perfectly into the research strategy of the new ETH centre of competence World Food System (→ page 14), which will concentrate mainly on sustainable agriculture.

→ www.ressourcen.ethz.ch/real_estate/index_EN

Well positioned

Since it was first set up in 2010, the ETH Career Center has managed to position itself successfully at the interface between industry and students. It provides tailored support for students and doctoral students until they embark on their careers and also ensures that companies are able to make contact with suitably talented young people. During the last two semesters, a number of events took place at which companies were able to introduce themselves to interested students. The companies were very pleased with these events: our existing partner companies want to keep up their cooperation with the ETH Career Center in 2012 and will continue to give it financial support.

Further guidance on preparing for professional life was offered by a panel discussion organised by the ETH Career Center on the subject "Major corporation or SME", at which a number of companies introduced themselves.

The ETH Career Center also offers its expertise to employers, for example if they have questions about the graduate employment market or require help with their marketing activities. The demand for this service does not only come from local companies. For example, the Career Center has even been contacted by a company from the US which wanted to move its headquarters to Zurich.

However, ETH students and doctoral students do not only benefit from company events but also from the training sessions and individual advice that the ETH Career Center offers. So far, about 450 students and doctoral students have taken advantage of a personal careers advice interview. In a student satisfaction survey that was carried out recently, 91 percent of the approximately 190 students who took part said that the advisory service provided by the ETH Career Center had helped them to make a successful job application or take stock of their situation.

→ www.careercenter.ethz.ch/index_EN

The services provided by the ETH Career Center have been very well received by both companies and students.

Alumni network continues to grow

The international Alumni Network expanded even more in 2011: following the new branches set up in China, Japan, Singapore and Italy, new representative bodies have now also been founded in Boston and London. Furthermore, on 4 November there was a ceremony attended by ETH President Ralph Eichler to mark the opening of the Bay Area Chapter in San Francisco.

The third Homecoming Day proved extremely popular: on 28 August about 600 alumni came to ETH Zurich to find out for themselves about what is going on at their alma mater. There were also other alumni events offering networking opportunities such as the cultural brunch with the German literature scholar Peter von Matt and the business events with Jasmin Staiblin (ABB Schweiz), Carsten Schloter (Swisscom) and Hansueli Loosli (Coop Schweiz).

The various workshops, lectures and seminars held under the general title of "ETH Alumni Career Advancement" were also very well received. These addressed topics such as strategy development, staff management, conflict management, conducting negotiations and pension provision, not to mention dress codes and voice training.

→ www.alumni.ethz.ch

Well equipped for a successful career

In summer 2011, 52 apprentices at ETH Zurich successfully completed their final examinations. Over half of them received the mark 5 (good) or above. The performances by the apprentices reflect the quality of the professional training at ETH Zurich. Not least because of its close links with academic study, it is remarkable for offering a very wide range of opportunities for experimental work. For the first time in 2011, two apprentices completed a professional apprenticeship in technical maintenance. This training programme teaches apprentices how to monitor and maintain building services.

The way the university is constantly developing the types of teaching and learning that it offers, at all levels of training, is also reflected in our apprentice numbers: whereas, in the year 2000, ETH trained 112 apprentices for eleven different vocational fields, by 2011 the figure had reached 153 apprentices and trainees, and 15 vocational fields. There are 1000 to 1200 applications each year for the 55 available places for apprentices. About one fifth of the apprentices remain at ETH Zurich after finishing their training.

→ www.lernende.ethz.ch

In summer 2011, 52 apprentices at ETH Zurich successfully completed their final examinations.

Attracting more women

ETH Zurich would like to increase the proportion of women studying in the so-called MINT disciplines (Mathematics, Information Technology, Natural Sciences, Technology). Since interest in science and technology begins in early childhood, Equal!, the Office of Equal Opportunities, has worked with the Department of Physics and the two National Centres of Competence in Research "Quantum Science and Technology" and "Molecular Ultrafast Science and Technology" to develop a computer game called "MINT Land" for 10- to 13-year-olds. The game is designed to make science and technology more accessible, especially for girls, and show them how these subjects are part of our everyday life. A prototype version of the game was presented at the science event "Scientifica" which took place in Zurich at the end of August (→ page 40). Girls and boys felt that the game appealed to them both equally. In the next stage, "MINT Land" is to be further developed and tested with more children.

Questions of gender are also a topic for research. At the invitation of Equal! and the Department of Humanities, Social and Political Sciences, Londa Schiebinger, Professor of History of Science at Stanford University and expert in the field of "Gender in Science and Technology", spent two weeks as a visiting professor at ETH Zurich last November. As well as holding meetings with various ETH bodies (Executive Board, Heads of Department Conference, Research Commission, the Rector, Women Professors' Forum, Diversity Strategy Working Group), Schiebinger also gave public lectures on the subjects of "Gendered Innovations in Science and Engineering" and "Subtle Gender Biases in Science Institutions". She showed how failing to consider gender issues limits the prospects for research and how scientific institutions reduce the equality of opportunity for men and women by unintentional discrimination. Schiebinger's visit also served as preparation for two semester-long stays at ETH Zurich by visiting professors in the field of "Gender in Science and Technology" in 2012 and 2013.

→ www.equal.ethz.ch/index_EN

Securing funding sustainably

Student numbers are growing while the basic funding from the federal government remains stagnant: once again in 2011, financial management at ETH Zurich was sorely tested. Thanks to the university's efforts to make savings, and increased use of third-party funding, it was able to maintain its flexibility for the short term.

The financial situation at ETH Zurich remains difficult. Because of its appeal as a place to study for students from Switzerland and, increasingly, also from abroad, numbers continue to rise. Since the year 2000, the university has seen a growth in total student numbers of more than 60 percent. However, over the same period, the federal government's financial contribution to ETH Zurich has only risen by 8.8 percent when adjusted for inflation. This means that the gulf between what industry and society expect of a prestigious university and the funding that is provided by the federal government as its sponsor has widened even more. Last year, ETH Zurich mainly succeeded in maintaining its flexibility thanks to a series of internal savings, further administrative streamlining and increased use of third-party funding. Project-based research funding by third parties does bring relief for the budget in the short term, but causes follow-up costs in the long term. To maintain its growth sustainably, ETH Zurich is dependent on real and solid growth in its funding from the federal government for the long term.

Rising expenditure

ETH Zurich's total expenditure in 2011 amounted to CHF 1455 million (up 7 percent on 2010). Of that, CHF 1101 million was covered by the federal financial contribution (CHF 1089 million federal funding allocated for 2011, CHF 12 million of reserves released from advance funding for the HPCN/LCA building). That equates to 76 percent (2010: 80 percent). The expenditure covered by third-party funding rose markedly, to CHF 353 million (up 27 percent).

Just how important third-party funding has now become for ETH Zurich's work can be seen by looking at the income side (see diagram): over the last eleven years, its proportion of ETH Zurich's total income has risen from 15 percent (2000: CHF 160 million) to 25 percent (2011: CHF 362 million). In 2011, somewhat more than half of this third-party funding came from Swiss national research sponsorship or from European research programmes. The other half was the result of cooperation agreements with industry, endowments and legacies and the proceeds from various services as well as financial returns.

Sponsorship provides flexibility

Once again in 2011, the ETH Zurich Foundation was able to reach agreement on donations from well-known companies, foundations, associations and private individuals. Consequently, last year the Foundation received promises of financial support for ETH Zurich amounting to a total of CHF 63 million (→ page 68). Thanks to these donations, the university is able to implement its strategic objectives more quickly, for example, appointing new professors sooner (→ page 66).

However, these donations cannot replace regular budget funding but instead supplement it in key focus areas: for example, a donation allows ETH Zurich to fund a new chair for about 10 years, but after that the costs have to be covered from regular budget funding. This is because, on average, once a professor has been appointed they work at ETH Zurich for about 23 years. In addition to the funding in later years, it is also necessary to provide all the infrastructure for a chair out of regular budget funds; for example, premises, research laboratories, technical equipment and IT and communication technology.

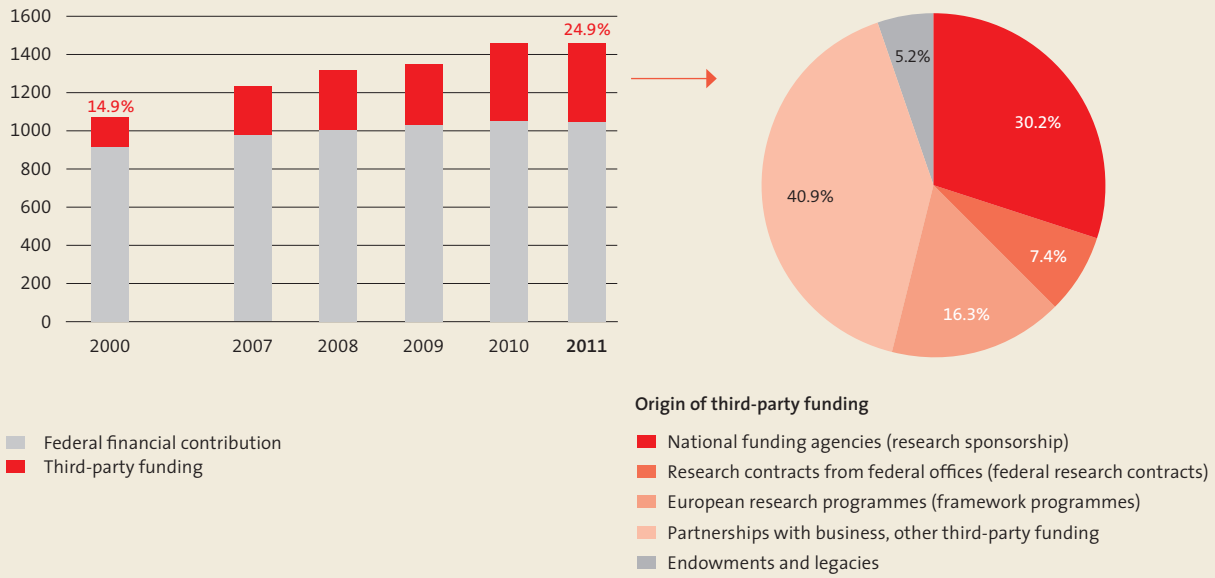
No compensation for basic funding

The situation is even more acute when it comes to funding acquired competitively from research programmes. Admittedly, the increase in this funding is very pleasing, because it is impressive evidence of the excellence and competitiveness of the researchers at ETH Zurich. However, for the university, it represents a growing challenge: firstly, funding is often only promised for selected major projects that are

"Sustained financing of growth at ETH Zurich by the federal government will pay off."

Robert Perich, Vice President Finance and Controlling

Development and structure of ETH Zurich's income



A look at the changes in ETH Zurich's income shows the growing importance of third-party funding. This is mainly earmarked funding and primarily benefits research. When it comes to the education provided, or developing the infrastructure, on the other hand, it is usually not possible for third-party funding to replace the basic funding from the federal government. That is why steady growth in the federal financial contribution is absolutely essential if ETH Zurich is to be sustainably financed.

very precisely defined, and so it cannot be included in strategic planning and does not have a lasting effect. Secondly, this funding often only covers the direct project costs. Only a small proportion of the overhead costs for infrastructure and administration is covered, if any. And in the case of European research projects, often only three-quarters of the direct costs are covered. In these cases, ETH Zurich has to pay not only the overhead costs but also some of the project costs with what are called "matching funds".

All potential for improvement is exhausted

In recent years, by restructuring and making organisational improvements, ETH Zurich has succeeded in maintaining the high quality of the education it provides, despite the growth in student numbers, and has moderately expanded research in key areas. The general budget reduction of 2.5 percent which was imposed on all units last year has helped with this, as have the organisational changes, with research facilities being shared by different departments and lectures broadcast to other lecture theatres. However, the potential for restructuring is now exhausted. Investment in infrastructure has also been postponed, and this is now urgently required (→ page 26).

Rapidly increasing need for funding

More students means more space needed in lecture theatres and canteens; professors and senior scientists need offices and research laboratories. To express it in economic terms, the growth is causing step fixed costs. This means that the financial planning shows demand for funding growing dramatically. The budget requires about 1 billion francs by 2016 simply for investment in buildings.

This investment can only be financed sustainably with additional federal funding. In terms of the economy as a whole, such investment makes sense. With their broad knowledge of basic principles, ETH graduates drive innovation in the economy and create lasting growth for Switzerland.

→ www.fc.ethz.ch

Sustainability has taken root

ETH Zurich is committed to greater sustainability on a number of different levels: it has converted "ETH Sustainability" into a permanent office, is setting new standards in environmental reporting, adopts an innovative approach to updating its buildings and has taken countless measures to optimise its energy consumption.

Sustainability is a central concern for ETH Zurich, and this is reflected in four main areas: in its role as an educator, it teaches the students key aspects of sustainability (→ page 10). In its research, ETH Zurich is aiming to reinforce its leading position in environmental and sustainability research with its thematic focal area "Sustainable Worlds" (→ page 14). This encompasses three fields of research: urban planning, energy and climate, and agriculture and nutrition. Through coordinated publicity work, ETH Zurich intends to make its activities more well-known both internally and externally and make a contribution to public debate (→ page 36). Finally, under the slogan "Campus Sustainability", it strives to improve sustainability on both the city-centre and Hönggerberg campuses.

Taking the lead on reporting

In carrying out all these tasks, the coordinating office "ETH Sustainability", which was set up in 2008 as part of the "Sustainability ETH Project", serves as a very important central hub. In view of the positive assessment it has received from external experts, in October 2011 the Executive Board decided to make ETH Sustainability directly responsible to the ETH President as a permanent office. Its task will be to link together the activities of the various departments and centres of competence dealing with sustainability and coordinate their efforts to give them a higher profile.

ETH Zurich set a new standard in June 2011 when it became the first university anywhere in the world to publish a sustainability report complying with both the guidelines of the Global Reporting Initiative (GRI) and the criteria of the ISCN-GULF Sustainable Campus Charter. The document describes the programmes in which ETH Zurich is involved and the measures it is taking in relation to sustainability. By complying with the GRI guidelines which are widely recognised by industry, ETH Zurich plans to make apparent to both society and industry the extent of its success on sustainability. The "Sustainability Report 2009 to 2010" shows how ETH Zurich formulated clear objectives and was able to make progress in many different fields. As a result, once again in 2011 it is able to report excellent results against a number of environmental and energy parameters. This can be attributed to two main factors: the upgrading of buildings and improvements to operational systems.

Two different approaches

In updating its buildings, ETH Zurich has taken two different courses of action on its Hönggerberg campus. While the HPP tower block was renovated to meet the conventional Minergie standard, a new approach has been taken to the upgrading of the HPZ building: here, a number of innovative technologies have been put to the test for real. The building has an efficient, need-based ventilation system and is fitted with innovative insulating glass panels (so-called M-glass) and low-energy LED lighting. Now the effectiveness of the new features in the HPZ building can be compared directly with the Minergie standard applied to the HPP block. In 2012, both buildings will be connected to the dynamic earth storage system on the Hönggerberg.

Countless smaller measures are also being taken to ensure that energy consumption at ETH Zurich is being systematically reduced. The operating parameters for cooling systems, machinery and ventilation equipment are constantly being improved. Old and inefficient systems are replaced by more energy-efficient ones. Heat recovery plants and savings on lighting have all helped to improve energy efficiency. Altogether the measures introduced in the last five years have led to annual savings of 19,000 MWh of heating and approximately 8000 MWh of electricity. In this way, it has been possible to reduce energy costs by 2.8 million francs a year.

A survey completed at the end of 2011 showed the areas in which there is still a need for further action to be taken. This indicated that the greatest potential savings lie in optimising the computer centres, ventilation and air conditioning systems and lighting. The possible annual savings on electricity are estimated at over 15,000 MWh, though the measures to be taken still have to be assessed in detail. Regarding the lighting, which accounts for about 10 percent of electricity consumption, improvements have already been made: very efficient LED lighting has been installed in the Main Building, and the 30-year-old exterior lighting on the Hönggerberg site is being replaced by LED lights.

ETH Zurich has renovated two buildings on the Hönggerberg campus: the HPP block in the background was renovated to meet the Minergie standard. In the HPZ building in the foreground, on the other hand, some innovative technologies have been tested for real.

Staff and students play their part

The members of ETH can also make a real contribution to protecting the environment through their behaviour. To encourage staff to drink tap water instead of bottled mineral water, in October and November they had the chance to obtain a water bottle with the ETH logo free of charge. There is also considerable potential for saving energy on business trips. The "Trip-Drops" project is intended to show how business trips could be avoided, or where use could be made of alternatives such as videoconferences.

In November, a hot topic for debate was the fact that, as of December 2010, the university had no longer been using eco-electricity but the cheapest electricity, which includes a high proportion of energy from nuclear power. The Executive Board had decided to invest the savings of about 800,000 francs a year directly in energy research. ETH President Ralph Eichler had two meetings with students who had criticised the decision. He invited them to help with updating the ETH Energy Guidelines which regulate the basic principles of ETH Zurich's approach to energy matters.

→ www.sustainability.ethz.ch/index_EN

→ www.sicherheit.ethz.ch/index_EN

→ www.gt.arch.ethz.ch/research/HPZ_EN

Social commitment of ETH Zurich

ETH Zurich provides numerous **services** on behalf of the federal government and operates **cultural facilities** such as museums and archives. It maintains a regular **dialogue with the general public** and, thanks to its specialist expertise, is able to make an important contribution to public debate.

Expert opinions on current issues

ETH Zurich works for the good of society on a number of different levels: it provides specific services, takes part in social debate and gives the general public fascinating insights into the world of science.

As a leading international university, ETH Zurich is not only active in the fields of education, research and knowledge and technology transfer, but it also puts its expertise at the disposal of the general public in debate on current issues. For example, it not only provides regular assessments of economic trends and the euro crisis but is also taking part in the current debate on energy. By putting scientific principles into the public domain, ETH Zurich enables politicians and society at large to make well-founded decisions.

Important contribution to the energy debate

This autumn, ETH Zurich made an important contribution to the current debate on energy. The global demand for safe, affordable and reliable energy sources is growing, and not only since the nuclear catastrophe in Japan. Thanks to its broadly-based and interdisciplinary approach, ETH Zurich is able to provide sound evidence about how this demand could be met. At the Energy Talks, held in the presence of Energy Minister Doris Leuthard, ETH researchers and well-known figures from industry and politics debated what form sustainable energy could take in future. The event was particularly topical thanks to the recent decision by the Federal Council gradually to withdraw from nuclear energy. The event was very popular: on 2 September 2011, about 1000 people came to ETH Zurich to hear the speech by the Federal Councillor, the lectures by ETH researchers and the two podium discussions.

"ETH Zurich makes an important contribution to social debate."

Ralph Eichler, President of ETH Zurich

It was also at the Energy Talks that the key findings from the ETH study entitled "Energiezukunft Schweiz" ("The future for energy in Switzerland") were presented. In this, experts from the Energy Science Center (ESC) showed that a phased withdrawal from nuclear energy is feasible. The study, which has been available to download since November, confirms that restructuring the energy system without nuclear energy by 2050 is in principle possible technologically and at an economically acceptable cost. However, this will require a major effort in all sectors of the economy and at all levels of society if the desired switch in energy sources is to be achieved with no reduction in the standard of living and while keeping to the climate targets that have been set.

ETH Zurich will continue to take part in the energy debate: for example, in mid-November Federal Councillor Doris Leuthard created an "Advisory Committee on the Energy Strategy up to 2050", of which ETH Professor Konstantinos Boulouchos is a member. As one of the founders of the ESC, he was closely involved in developing the ETH Energy Strategy in 2008 and is also the coordinating author of the "Energiezukunft Schweiz" study.

Well-founded background knowledge

The expertise of ETH scientists is also called upon after natural disasters or in international conflicts. For example, experts from the Swiss Seismological Service (SED) and the Laboratory for Nuclear Energy Systems regularly appeared in the media as informed experts following the devastating tsunami in Japan on 11 March 2011 and the subsequent nuclear disaster at Fukushima. Their assessments of the situation explained to the general public how the devastating catastrophe came about, what was going on inside the stricken reactors and what it could all mean in the longer term. They also voiced an opinion about how well equipped Swiss nuclear power plants are to withstand severe earthquakes. Expertise from ETH Zurich was also in demand during the Libyan crisis: during the war, scientists from the Center for Security Studies (CSS) gave a series of interviews in which they commented on the progress of the conflict and the role of western countries. With their expert knowledge they were able to help the public to gain an understanding of the complex events in North Africa.

Highly regarded site

The Internet platform "Ökonomenstimme" ("Voice of Economists"), which was launched on 22 March 2010 by the Swiss Institute for Business Cycle Research (KOF) at ETH Zurich, has become a highly regarded website. The "Ökonomenstimme" tackles all kinds of economic questions and is intended not

The Energy Talks on 2 September attracted a great deal of interest: about 1000 people came to ETH Zurich to hear the speech by Federal Councillor Doris Leuthard, the lectures by ETH researchers and the podium discussions.

only for economists but also for interested non-experts. So far about 300 articles have been posted, material has been contributed by nearly 350 authors, including some of the best-known economists in German-speaking countries, and over 125,000 unique users have visited the platform. With over 4000 visitors a week, the "Ökonomenstimme" has now become one of the leading platforms in this field. Articles published on the website are also reprinted in prestigious newspapers such as the "NZZ". In April 2011, the "Ökonomenstimme" was awarded the special prize in the "Comdirect Finanzblog Awards 2011".

With the rise of the Swiss franc, the demand for advice from the KOF has also increased sharply. Shortly before the intervention by the Swiss National Bank (SNB) at the beginning of September to set a lower limit for the exchange rate with the euro, there were a great many enquiries from the media, not only in Switzerland and Germany but also from Poland, Japan, England and Arab countries. The KOF was also invited to join the Economic Commission set up by the Swiss National Council and Council of States, so that it could give its assessment of currency trends. Jan-Egbert Sturm, Head of the KOF, also took part in the round table which was convened by Federal Councillor Johann Schneider-Ammann in the run up to the intervention by the SNB.

→ www.esc.ethz.ch
→ www.seismo.ethz.ch/index_EN
→ www.lke.mavt.ethz.ch/research/index_EN
→ www.css.ethz.ch/index_EN
→ www.kof.ethz.ch/en
→ www.oekonomenstimme.org/english

Scientific memory

Without storage, no memory – without memory, no future. In our fast-moving digital age, this statement is truer than ever. In this context, the ETH library performs a vital service for science.

Science lives by the publication and communication of its data and findings. If these were not published and so made accessible to other scientists and the general public, no scientifically based progress would be possible. Switzerland and ETH Zurich can be proud of the fact that Swiss research is among the most highly regarded in the world, as shown by surveys carried out by the State Secretariat for Education and Research (SBF). Papers by Swiss researchers are cited more often worldwide than any others except those by researchers in the US.

Navigating in a sea of data

At ETH Zurich alone, researchers produced about 10,000 scientific publications in 2011. The ETH library plays an important part in the gathering and storage of this knowledge. For a year now, it has been systematically recording the fruit of researchers' labours and making it available online in accordance with international standards of librarianship. ETH E-Citations is the ETH Zurich university bibliography and is freely accessible online. The index gives a broad overview of the research work at ETH Zurich and the findings from it and makes them available for viewing worldwide. It provides a permanent record of all scientific publications produced at ETH Zurich or with input from at least one member of ETH, and also ensures that it is possible to cite printed or digital publications which are not distributed via booksellers or publishing houses.

This is where the ETH E-Collection, which has been in existence for some time now, comes in. This offers all members of ETH Zurich an alternative publishing platform in addition to the traditional publishing channels. During 2011, the holdings of the E-Collection reached a new high with about 26,000 documents.

Preserving data for the long term

However, the library is not only useful when it comes to safeguarding and providing access to scientific findings. Research nowadays is increasingly based on vast data sets that are available not just to one research group but to the research community in general. In Systems Biology, for example, whole libraries of data are being produced, containing details about the molecular composition of genetic information. Similarly, the modelling carried out by climate researchers would be inconceivable without access to data gathered over many years. Quite apart from these specific areas, the need to store research data sets for the long term and keep them available is growing among many research groups at ETH Zurich. In the "Digital Curation" project which began at the end of 2010, the ETH library is working with its partners to create a technical platform to assist researchers with the management and long-term storage of their data.

→ http://e-citations.library.ethz.ch/index.php

One of the main responsibilities of the ETH library is to collect and store the numerous publications by ETH researchers.

Library statistics	2011
Overall holdings	7,692,000
of which individual works and bound volumes	2,838,000
of which current printed journals	5,330
Electronic documents	294,000
of which electronic journals	13,900
of which e-books	85,000
of which ETH E-Collection documents	25,800
Loans	289,000
Journal articles (copies sent)	94,000
ETH E-Collection visits	3,032,000
Licensed electronic journals visits (extrapolation)	3,646,000
Database visits (extrapolation)	410,000

50 years of DEZA

The Swiss Agency for Development and Cooperation (DEZA) this year celebrated its 50th anniversary in various Swiss cities. In Zurich it did so at ETH – with good reason, because there have been close links between the two institutions for a long time: ETH Zurich has been actively committed since the early 1950s to working in the interests of developing and emerging countries and has played an important role over the years in defining Swiss international development work.

Even after the foundation of the Technical Cooperation Service in 1961, out of which grew today's DEZA, the whole field of development cooperation remained an important one for ETH Zurich. For example, at the end of the 1960s, three ETH professors initiated the setting up of a continuing education programme for experts on development. This initiative gave rise to NADEL (postgraduate studies on developing countries), offering training and further education for young professionals and those already working in the field. The North-South Centre, created in 2007 from the merger of the Centre for International Agriculture and the Network for International Development and Cooperation, also reflects ETH Zurich's commitment in this area. Researchers from ten ETH departments and from the ETH Domain are involved in this Centre which also organised the series of events at ETH Zurich to mark the DEZA anniversary.

Development think-tank

With their series of events entitled "Denkplatz Entwicklung" ("Development think-tank") in autumn 2011, ETH Zurich and DEZA reflected on the past, present and future of Swiss development cooperation. The series was launched on 30 September 2011 in the presence of President of the Swiss Confederation, and Foreign Minister, Micheline Calmy-Rey. She said she was sure that ETH Zurich was ideally placed to devise new concepts for solving the problems of developing and emerging countries. An important role will be played in this by the newly founded competence centre on the World Food System which deals among other things with issues relating to sustainable agriculture in those countries.

The anniversary exhibition "Die andere Seite der Welt" ("The other side of the world"), which ran from 1 October to 11 November 2011 in the ETH Main Building and will now be available to visit in various locations in Switzerland until 2013, reflects the history of Switzerland as a humanitarian country. In 80 interviews, contemporary Swiss witnesses speak of their experiences since 1945 in humanitarian aid, development cooperation and the fight for human rights.

Four more public events at ETH Zurich also dealt with development cooperation in the past, present and future: on 14 October, an international panel discussed the burning issue of "Is foreign aid good or bad for Africa?". Then, following a discussion by contemporary witnesses in the Archives of Contemporary History, on 2 November another platform discussion tackled the question of "What can solidarity cost us?". Finally, on 10 November, the annual conference of the North-South Centre discussed "Information and communication technologies for development". The programme was rounded off with a colloquium and workshop for students and doctoral students, and opportunities for school groups to meet contemporary witnesses at the Archives of Contemporary History.

The events marking the DEZA anniversary also highlighted the role of ETH Zurich in development cooperation.

→ www.ethz.ch/deza_anniversary
→ www.nadel.ethz.ch/index_EN
→ www.northsouth.ethz.ch

The fascination of science

For ETH Zurich, it is very important to maintain a dialogue with the general public. In 2011, together with the University of Zurich, it organised for the first time an event called "Scientifica – Zurich Science Days" and so highlighted the importance of Zurich as a scientific centre.

On the weekend of 27/28 August 2011, over 15,000 visitors streamed into the main buildings of ETH Zurich and the University of Zurich and discovered the fascination of science for themselves at the "Scientifica" event. Over three days, 250 researchers from the two universities presented Zurich as a city of science at its best. The main focus was on the topic of energy. Especially the Sunday programme, when the organisers laid on lots of attractions for children, brought numerous families into the two main buildings – to chemistry shows, lectures for children or a robot programming course specially designed for children.

The "Scientifica" marquee on the Polyterrasse turned out to be a real focus of attention. Both the Science Slams, when scientists had to present their research as entertainingly as possible in no more than ten minutes, and the Science Talks, during which celebrities such as Federal Councillor Eveline Widmer-Schlumpf or actor Mike Müller had the opportunity to choose a scientist to interview, attracted a great deal of interest. About 4000 people also attended the 45 short lectures which were held in the lecture theatres at both universities.

"Scientifica" 2011 was a huge success and the event will be repeated in 2012: an attractive programme on the theme of health is being planned.

Popular window on science

The local population also showed great interest again in 2011 in the series of science events called "Treffpunkt Science City". About 10,000 visitors took the opportunity to experience life at ETH Zurich for themselves, by attending short lectures, Science Talks, presentations, lab visits, exhibitions and guided tours. The spring series, from 20 March to 17 April, was dedicated to the theme of water in all its aspects, from drinking water processing and waste water purification to its use for energy and agricultural irrigation systems. The autumn series, from 23 October to 4 December, had the theme "Discoveries – Inventions". It showed how scientists at all levels try to understand mankind better, explore the world and shape the future.

"Scientifica" 2011 attracted a great deal of interest from families, especially on the Sunday with its appealing range of activities.

Open days in Basel

On 24 October the scientists in the Department of Biosystems Science and Engineering (D-BSSE) at the ETH site in Basel invited interested members of the public to come and gain an insight into their varied areas of research. For example, the researchers showed the approximately 700 visitors how they use sophisticated computer models to simulate how organs are formed from cells, how they use targeted cell manipulation to look for molecular switches which will influence cholesterol levels, or how they can use special microchips to make the signal processing in nerve cells visible.

→ www.scientifica.ch
→ www.ethz.ch/news/treffpunkt/index_EN
→ www.bsse.ethz.ch

Chemistry – a cultural achievement

01 – The two ETH departments of Chemistry and Applied Biosciences and Materials Science, along with the Department of Chemistry-Biochemistry at the University of Zurich, hosted a number of events in June 2011 to mark the International Year of Chemistry. Under the title "Kulturleistung Chemie" (Chemistry – a cultural achievement), the two universities showed what chemistry, as a key discipline in natural science, has contributed to mankind. The festivities began with the opening celebration called "Vision" and finished with an afternoon debate aboard a boat on Lake Zurich. The highlight was the jointly organised Day of Chemistry, when the two universities opened their buildings to the general public. While ETH Zurich laid on a programme based on "Werkstoffe, Wirkstoffe, Naturstoffe" (materials, active substances, natural materials), activities at the University of Zurich focused on the theme of "Duftstoffe, Kunststoffe, Farbstoffe" (fragrances, plastics, dyes).

→ www.ethz.ch/year_of_chemistry

25 years of gta exhibitions

02 – For 25 years now the "gta exhibitions" have been the showcase for the work of the Department of Architecture and its graduates – and more: today the exhibitions also demonstrate architectural trends in Switzerland and abroad. Over 250 exhibitions have brought science and architecture closer to the general public. A particular magnet for the public was the exhibition in 2010 on the new Monte Rosa Hut. Since then it has gone on an international tour and could be seen in 15 different venues, while in 2012 it will be presented in, among other places, the European Capital of Culture Maribor and in Ljubljana. In its anniversary exhibition, the Institute for the History and Theory of Architecture at ETH Zurich (gta) showed how the exhibition format has developed into a platform for Swiss architectural debate. Together with the gta Archives and gta Publishers, it represents a range of amenities that is unparalleled in Swiss architecture.

→ www.ausstellungen.gta.arch.ethz.ch/home-en


01


02


03

Legacy in the limelight

03 – ETH Zurich, where Max Frisch received his degree as an architect in 1940, has been looking after the legacy of the world-famous author for three decades now. To mark the 100th anniversary of Max Frisch's birth, the Archive launched an online image database of about 4000 pictorial documents giving an insight into his life. The Archive was also involved in countless other activities publicly commemorating the writer's life and work. One outstanding example was the exhibition at the Strauhof Museum in Zurich which attracted over 10,000 visitors and will now go on display at the Academy of Arts in Berlin in 2012. In 2011 the Archive was also able to take over some holdings from the legacy that had previously been blocked by a special order, such as the "Berliner Journal" and the correspondence between the writer Ingeborg Bachmann and Max Frisch.

→ www.mfa.ethz.ch/en

Reproducibility

Ever since October 2009, at the Collegium Helveticum, the Transdisciplinarity Laboratory at ETH Zurich and the University of Zurich, seven Fellows, some Associated Fellows and a visiting professor in cultural science have been studying the theme of "Reproducibility, prediction, relevance". The resulting research projects will continue to be studied in greater depth until 2014 and aspects of them presented to the general public at evening events.

In 2011, the Collegium Helveticum once again sought to enter into dialogue with the general public and conducted three symposia with its partners: with the Zurich-Basel Plant Science Center, the Collegium hosted the 5th Expert Conference on green genetic engineering under the title "Green gene technology: where next after NRP59 and the moratorium?", with the Centre for the History of Knowledge it organised the three-day Latsis Symposium on "Science and Democracy", with the Literaturhaus Zurich and the visiting professor in cultural science Michel Mettler it put on a two-day conference entitled "The I in literature".

→ www.collegium.ethz.ch

ETH Zurich – names and facts

Detailed **figures** on finance, staff and students provide information about the year just ended. **Honours and prizes** pay tribute to outstanding performances by our staff. Thanks to **new professorships** and generous **donations,** ETH Zurich is on course for a successful future.

Development of ETH Zurich

In 2011, 6,333 students began courses at ETH Zurich. That is over twice as many new admissions than in the year 2000. The total number of students rose again to 17,187 (headcount). This means that about 60 percent more young people are studying at ETH Zurich today than in the year 2000. Since students can enrol for more than one programme, the number of enrolments is even higher, at 17,887.
ETH Zurich's budget appropriations amounted to 1,455 million francs. Of that, 1,101 million francs came from the federal financial contribution. On the following pages you can find detailed statistics and further explanatory remarks.

Students	**2000**	**2007**	**2008**	**2009**	**2010**	**2011**
New enrolments[1] (details from page 46)	**2,614**	**4,433**	**5,314**	**6,073**	**6,081**	**6,333**
Percentage women	*28.0%*	*30.3%*	*31.5%*	*32.2%*	*31.8%*	*31.7%*
Percentage foreigners	*26.1%*	*30.3%*	*37.6%*	*37.6%*	*39.8%*	*40.1%*
Bachelor students	0	1,994	2,167	↑,443	2,450	2,562
Master students	0	1,278	1,455	1,871	1,860	1,904
Diploma students	1,717	2	0	0	0	0
Visiting/exchange students	98	112	461	459	474	492
Doctoral students	613	745	922	939	957	1,035
MAS/MBA students	186	302	309	361	340	340
Students, headcount[1] (details from page 47)	**10,693**	**13,233**	**14,310**	**15,378**	**16,343**	**17,187**
Percentage women	*25.1%*	*29.7%*	*30.4%*	*30.6%*	*30.9%*	*30.8%*
Percentage foreigners	*20.3%*	*26.6%*	*31.0%*	*33.2%*	*34.9%*	*36.1%*
Total registrations	10,779	13,997	15,093	16,228	17,172	17,887
Bachelor students	0	6,821	7,134	7,628	8,101	8,439
Master students	0	2,284	2,987	3,701	4,235	4,563
Diploma students	8,130	1,408	848	463	220	1
Visiting/exchange students	83	112	345	355	322	362
Doctoral students	2,262	2,907	3,205	3,396	3,521	3,699
MAS/MBA students	304	465	574	685	773	823
Student-faculty ratio	32.1	35.9	38.5	39.6	39.6	40.1
Graduations[1] (details from page 49)	**1,890**	**2,932**	**3,171**	**3,410**	**3,382**	**3,709**
Percentage women	*25.1%*	*29.2%*	*28.3%*	*29.7%*	*31.2%*	*31.4%*
Bachelor degrees	0	838	1,086	1,203	1,283	1,304
Master degrees	0	425	861	1,143	1,257	1,506
Diplomas	1,191	884	445	174	18	0
Doctorates	523	572	566	651	650	696
Diplomas for continuing education programmes	176	213	213	239	174	203
Personnel (details from page 52)						
Staff, headcount	**7,453**	**8,726**	**9,049**	**9,572**	**9,809**	**10,040**
Total full-time equivalents	5,464	6,560	6,741	7,111	7,284	7,501
Percentage women	*26.4%*	*29.6%*	*30.3%*	*30.4%*	*30.7%*	*31.2%*
Professors	333	368	372	388	413	428
Scientific staff	3,390	3,935	4,109	4,364	4,479	4,644
Technical, IT and administrative staff	1,624	2,126	2,123	2,212	2,241	2,276
Apprentices	117	131	138	146	150	153
Finances (details from page 54)						
Expenditure (in million CHF)	**1,058.9**	**1,217.1**	**1,263.8**	**1,306.9**	**1,359.3**	**1,454.8**
Federal financial contribution (in million CHF)	914.9[2]	965.5	1,001.4	1,039.3	1081.8[3]	1101.3[3]
Third-party resources (in million CHF)	144.0	251.6	262.4	267.5	277.4	353.5

[1] Excludes physical education and sports teacher as well as professional officer training, which ended with a Federal Diploma.

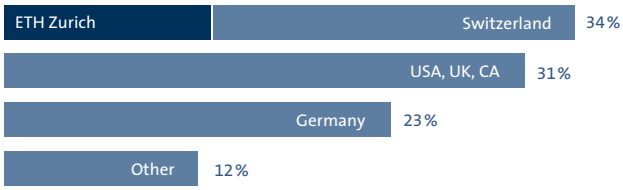
[2] Federal financial contribution in 2000: incl. funding from other federal agencies amounting to CHF 4.1 million.

[3] Federal financial contribution in 2010/2011: implementing the HPCN strategy/the new CSCS building was pre-financed with CHF 12.4 million in the year 2010. This advance funding was used in 2011.

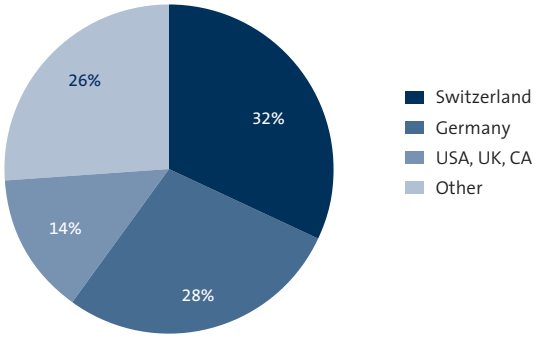
Recruitment of professors

As of the end of 2011, there were 462 professors (428 FTE) teaching and carrying out research at ETH Zurich. 66 percent of them were appointed to ETH from foreign universities, nearly half of those from the USA, the UK and Canada. 34 percent were previously employed at Swiss institutions, 32 percent of the current chairs are held by people with Swiss nationality.

Institution of origin (country)

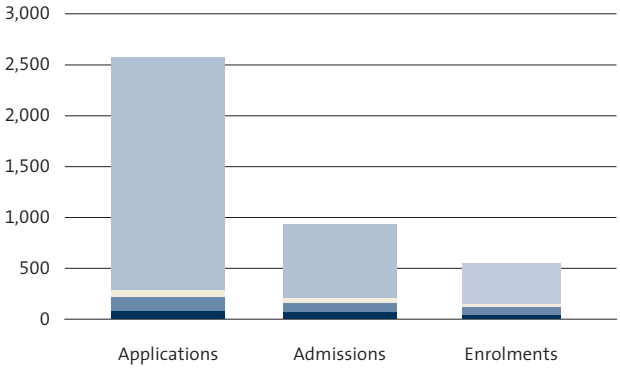


Nationality



Attractive Master studies

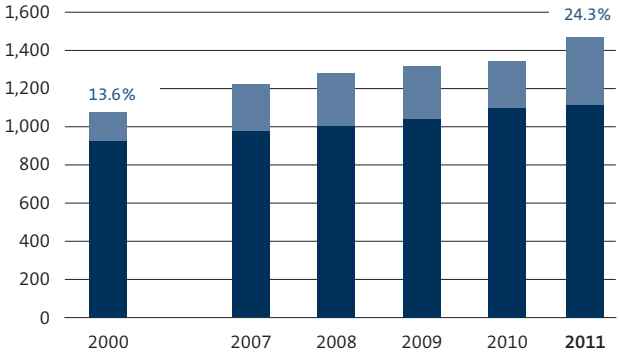
ETH Zurich offers attractive Master programmes for students who have completed their Bachelor degrees at another university in Switzerland or abroad. In 2011, around 2,600 students applied to study for a Master degree at ETH Zurich. 35 percent of the applicants were accepted for Master studies, with 60 percent of these actually taking up their place on the programme.



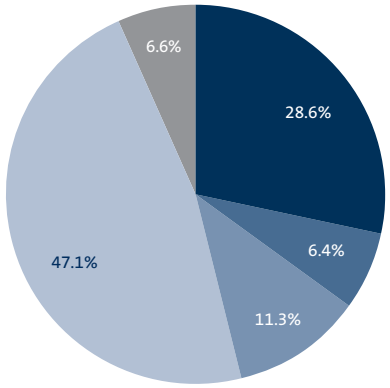
Origin	Applications	Admissions	Thereof Enrolments
Foreign university	2,290	30 %	57 %
Swiss university of applied sciences	70	57 %	68 %
Other Swiss university	141	74 %	74 %
EPF Lausanne	72	88 %	73 %
Total	2,573	35%	60%

- Foreign university
- Swiss university of applied sciences
- Other Swiss university
- EPF Lausanne

Financing of total expenditure



- Federal financial contribution
- Third-party resources



Origin of expenditure funded by third-parties

- National funding agencies (research sponsorship)
- Research contracts from federal offices (federal research contracts)
- European research programmes (framework programmes)
- Partnerships with business, other third-party funding
- Endowments and legacies

New students

	Total		Bachelor students		Master students		Visiting/exchange students		Doctoral students		MAS/MBA students[1]	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
ETH Zurich total (registrations)	**6,081**	**6,333**	**2,450**	**2,562**	**1,860**	**1,904**	**474**	**492**	**957**	**1,035**	**340**	**340**
Percentage women	*31.8%*	*31.7%*	*30.3%*	*31.7%*	*30.3%*	*31.1%*	*31.2%*	*32.7%*	*33.9%*	*29.7%*	*45.3%*	*39.7%*
Percentage foreigners	*39.8%*	*40.1%*	*21.0%*	*20.5%*	*36.1%*	*35.5%*	*97.0%*	*97.2%*	*66.9%*	*70.6%*	*39.1%*	*38.8%*
Programmes												
Architecture and Building Sciences	**1,193**	**1,218**	**580**	**578**	**357**	**334**	**79**	**76**	**102**	**124**	**75**	**106**
Architecture	654	644	303	283	196	190	53	41	32	54	70	76
Civil Engineering	299	331	164	186	75	80	15	21	45	44	0	0
Environmental Engineering	167	151	88	87	55	34	5	7	14	16	5	7
Geomatics and Planning	73	92	25	22	31	30	6	7	11	10	0	23
Engineering Sciences	**1,838**	**2,003**	**793**	**822**	**568**	**647**	**177**	**190**	**295**	**337**	**5**	**7**
Mechanical Engineering	790	834	438	446	180	210	64	64	108	114	0	0
Information Technology and Electrical Engineering	393	434	157	177	100	98	43	58	93	101	0	0
Biosciences and Engineering	77	104	0	3	49	72	0	6	28	23	0	0
Interdisciplinary Engineering Sciences	85	99	0	0	85	99	0	0	0	0	0	0
Computer Science	357	400	153	156	112	129	48	49	39	59	5	7
Materials Science	136	132	45	40	42	39	22	13	27	40	0	0
Natural Sciences and Mathematics	**1,890**	**2,006**	**784**	**877**	**568**	**557**	**117**	**120**	**307**	**354**	**114**	**98**
Mathematics	296	344	111	136	124	124	25	34	28	38	8	12
Computational Science and Engineering	41	40	17	20	23	16	0	1	1	3	0	0
Physics	422	438	176	199	107	113	29	30	66	77	44	19
Chemistry	248	244	63	72	69	32	33	31	68	94	15	15
Chemical Engineering	78	61	31	25	22	20	0	0	25	16	0	0
Interdisciplinary Sciences	67	88	49	61	14	26	0	0	4	1	0	0
Pharmaceutical Sciences	201	211	112	104	62	72	4	9	23	26	0	0
Biology	330	342	113	115	83	94	24	14	86	93	24	26
Human Movement Sciences	207	238	112	145	64	60	2	1	6	6	23	26
System-oriented Natural Sciences	**773**	**757**	**280**	**272**	**259**	**276**	**38**	**49**	**181**	**148**	**15**	**12**
Earth Sciences	174	197	33	45	95	110	5	12	35	26	6	4
Environmental Sciences	337	297	126	109	101	100	19	20	91	68	0	0
Forest Sciences	0	0	0	0	0	0	0	0	0	0	0	0
Agricultural Sciences	110	113	48	54	25	22	7	10	30	27	0	0
Food Sciences	152	150	73	64	38	44	7	7	25	27	9	8
Management and Social Sciences	**387**	**349**	**13**	**13**	**108**	**90**	**63**	**57**	**72**	**72**	**131**	**117**
Management, Technology and Economics	256	248	0	0	72	46	57	55	41	46	86	101
Humanities, Social and Political Sciences	131	101	13	13	36	44	6	2	31	26	45	16

[1]Students taking the teaching diploma for grammar schools or the MAS in Secondary and Higher Education are shown in the MAS/MBA students category. These two programmes certify graduation from a teacher training course.

Students

Students can enrol on more than one course at the same time. This is why the number of enrolments is higher than the number of people (headcount). For the purposes of the headcount, students are only counted on their main course (e.g. as Master students if they have enrolled on both Bachelor and Master courses).

	Total		Bachelor students		Master students		Diploma students		Visiting/exchange students		Doctoral students		MAS/MBA students[1]	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
ETH Zurich total (headcount)	**16,343**	**17,187**	**7,483**	**7,920**	**4,233**	**4,562**	**191**	**0**	**322**	**361**	**3,507**	**3,685**	**607**	**659**
Percentage women	*30.9%*	*30.8%*	*29.7%*	*30.1%*	*31.1%*	*30.9%*	*37.7%*	*0.0%*	*25.5%*	*33.2%*	*31.7%*	*30.4%*	*40.2%*	*38.7%*
Percentage foreigners	*34.9%*	*36.1%*	*19.1%*	*19.7%*	*36.0%*	*36.7%*	*13.1%*	*0.0%*	*96.0%*	*96.4%*	*63.0%*	*65.0%*	*35.6%*	*34.3%*
Total registrations	**17,172**	**17,887**	**8,101**	**8,439**	**4,235**	**4,563**	**220**	**1**	**322**	**362**	**3,521**	**3,699**	**773**	**823**
Programmes														
Architecture and Building Sciences	**3,462**	**3,538**	**1,987**	**1,949**	**931**	**1,002**	**6**	**0**	**55**	**59**	**338**	**389**	**145**	**139**
Architecture	1,934	1,942	1,112	1,060	576	625	4	0	31	31	104	122	107	104
Civil Engineering	876	910	564	556	150	170	0	0	13	17	149	167	0	0
Environmental Engineering	440	480	244	269	129	135	2	0	3	7	44	57	18	12
Geomatics and Planning	212	206	67	64	76	72	0	0	8	4	41	43	20	23
Engineering Sciences	**5,268**	**5,644**	**2,641**	**2,804**	**1,317**	**1,469**	**33**	**0**	**115**	**138**	**1,146**	**1,213**	**16**	**20**
Mechanical Engineering	2,272	2,431	1,389	1,497	436	477	9	0	50	49	388	408	0	0
Information Technology and Electrical Eng.	1,162	1,235	547	589	231	246	12	0	27	40	345	360	0	0
Biosciences and Engineering	190	248	23	24	114	148	0	0	0	7	53	69	0	0
Interdisciplinary Engineering Sciences	183	224	0	0	183	224	0	0	0	0	0	0	0	0
Computer Science	1,075	1,122	516	535	272	287	11	0	29	33	231	247	16	20
Materials Science	386	384	166	159	81	87	1	0	9	9	129	129	0	0
Natural Sciences and Mathematics	**5,239**	**5,445**	**2,447**	**2,643**	**1,111**	**1,147**	**132**	**1**	**80**	**89**	**1,135**	**1,191**	**334**	**374**
Mathematics	740	843	360	412	218	261	15	0	14	23	96	109	37	38
Computational Science and Engineering	128	141	78	85	42	44	0	0	0	1	8	11	0	0
Physics	1,079	1,129	500	533	211	241	22	0	23	23	243	255	80	77
Chemistry	623	634	186	201	108	83	14	0	25	28	257	279	33	43
Chemical Engineering	197	201	93	91	39	39	0	0	0	0	65	71	0	0
Interdisciplinary Sciences	193	218	148	167	27	39	0	0	0	0	18	12	0	0
Pharmaceutical Sciences	547	578	327	335	127	141	2	0	2	6	89	96	0	0
Biology	1,074	1,005	397	406	202	171	58	0	14	7	342	341	61	80
Human Movement Sciences	658	696	358	413	137	128	21	1	2	1	17	17	123	136
System-oriented Natural Sciences	**2,350**	**2,396**	**972**	**998**	**574**	**660**	**49**	**0**	**24**	**31**	**679**	**665**	**52**	**42**
Earth Sciences	516	551	173	145	171	247	2	0	5	6	146	137	19	16
Environmental Sciences	1,077	1,067	428	446	257	272	36	0	12	17	344	332	0	0
Forest Sciences	3	0	0	0	0	0	3	0	0	0	0	0	0	0
Agricultural Sciences	311	324	135	162	52	44	4	0	2	3	113	111	5	4
Food Sciences	443	454	236	245	94	97	4	0	5	5	76	85	28	22
Management and Social Sciences	**853**	**864**	**54**	**45**	**302**	**285**	**0**	**0**	**48**	**45**	**223**	**241**	**226**	**248**
Management, Technology and Economics	598	588	0	0	233	186	0	0	45	43	144	151	176	208
Humanities, Social and Political Sciences	255	276	54	45	69	99	0	0	3	2	79	90	50	40

[1]Students taking the teaching diploma for grammar schools or the MAS in Secondary and Higher Education are shown in the MAS/MBA students category. These two programmes certify graduation from a teacher training course and replace the Certificate of Teaching Ability. Students on the Certificate of Teaching Ability course are shown in the Diploma students category.

Foreign students by nationality in autumn 2011

Foreign-educated students are people of other nationalities who lived abroad before commencing their studies. They are therefore foreigners who come to Switzerland for the purpose of studying.

	2011		Bachelor students		Master students		Visiting/exchange students		Doctoral students		MAS/MBA students	
	Total	*in %*		*in %*		*in %*		*in %*		*in %*		*in %*
ETH Zurich total	**5,696**	***100.0***	**1,216**	***100.0***	**1,559**	***100.0***	**349**	***100.0***	**2,348**	***100.0***	**224**	***100.0***
EU	**4,105**	***72.1***	**1,094**	***90.0***	**984**	***63.1***	**224**	***64.2***	**1,654**	***70.4***	**149**	***66.5***
Germany	2,379	*41.8*	725	*59.6*	541	*34.7*	58	*16.6*	976	*41.6*	79	*35.3*
Austria	343	*6.0*	149	*12.3*	67	*4.3*	11	*3.2*	104	*4.4*	12	*5.4*
Italy	295	*5.2*	45	*3.7*	46	*3.0*	19	*5.4*	179	*7.6*	6	*2.7*
Greece	173	*3.0*	9	*0.7*	86	*5.5*	4	*1.1*	52	*2.2*	22	*9.8*
France	164	*2.9*	22	*1.8*	53	*3.4*	8	*2.3*	73	*3.1*	8	*3.6*
Luxembourg	132	*2.3*	89	*7.3*	29	*1.9*	0	*0.0*	13	*0.6*	1	*0.4*
Netherlands	80	*1.4*	3	*0.2*	25	*1.6*	24	*6.9*	27	*1.1*	1	*0.4*
Spain	78	*1.4*	16	*1.3*	13	*0.8*	21	*6.0*	25	*1.1*	3	*1.3*
Poland	72	*1.3*	7	*0.6*	10	*0.6*	4	*1.1*	46	*2.0*	5	*2.2*
Romania	64	*1.1*	8	*0.7*	31	*2.0*	1	*0.3*	22	*0.9*	2	*0.9*
Sweden	62	*1.1*	2	*0.2*	4	*0.3*	37	*10.6*	19	*0.8*	0	*0.0*
United Kingdom	35	*0.6*	0	*0.0*	10	*0.6*	2	*0.6*	21	*0.9*	2	*0.9*
Belgium	28	*0.5*	3	*0.2*	7	*0.4*	7	*2.0*	10	*0.4*	1	*0.4*
Others	200	*3.5*	16	*1.3*	62	*4.0*	28	*8.0*	87	*3.7*	7	*3.1*
Rest of Europe	**418**	***7.3***	**72**	***5.9***	**145**	***9.3***	**19**	***5.4***	**155**	***6.6***	**27**	***12.1***
Turkey	115	*2.0*	34	*2.8*	43	*2.8*	3	*0.9*	33	*1.4*	2	*0.9*
Russian Federation	86	*1.5*	3	*0.2*	25	*1.6*	3	*0.9*	50	*2.1*	5	*2.2*
Republic of Serbia	57	*1.0*	1	*0.1*	23	*1.5*	3	*0.9*	20	*0.9*	10	*4.5*
Liechtenstein	52	*0.9*	25	*2.1*	15	*1.0*	0	*0.0*	9	*0.4*	3	*1.3*
Others	108	*1.9*	9	*0.7*	39	*2.5*	10	*2.9*	43	*1.8*	7	*3.1*
Asia	**762**	***13.4***	**35**	***2.9***	**276**	***17.7***	**64**	***18.3***	**363**	***15.5***	**24**	***10.7***
China	300	*5.3*	18	*1.5*	130	*8.3*	27	*7.7*	120	*5.1*	5	*2.2*
India	159	*2.8*	1	*0.1*	63	*4.0*	9	*2.6*	78	*3.3*	8	*3.6*
Iran	84	*1.5*	2	*0.2*	19	*1.2*	2	*0.6*	59	*2.5*	2	*0.9*
Republic of Korea	44	*0.8*	6	*0.5*	15	*1.0*	4	*1.1*	17	*0.7*	2	*0.9*
Taiwan	26	*0.5*	1	*0.1*	6	*0.4*	0	*0.0*	17	*0.7*	2	*0.9*
Others	149	*2.6*	7	*0.6*	43	*2.8*	22	*6.3*	72	*3.1*	5	*2.2*
America	**334**	***5.9***	**10**	***0.8***	**131**	***8.4***	**32**	***9.2***	**141**	***6.0***	**20**	***8.9***
United States of America	101	*1.8*	1	*0.1*	42	*2.7*	10	*2.9*	45	*1.9*	3	*1.3*
Canada	65	*1.1*	0	*0.0*	26	*1.7*	10	*2.9*	29	*1.2*	0	*0.0*
Mexiko	47	*0.8*	2	*0.2*	28	*1.8*	3	*0.9*	12	*0.5*	2	*0.9*
Brazil	34	*0.6*	3	*0.2*	9	*0.6*	5	*1.4*	15	*0.6*	2	*0.9*
Columbia	33	*0.6*	1	*0.1*	12	*0.8*	0	*0.0*	18	*0.8*	2	*0.9*
Others	54	*0.9*	3	*0.2*	14	*0.9*	4	*1.1*	22	*0.9*	11	*4.9*
Africa	**61**	***1.1***	**3**	***0.2***	**15**	***1.0***	**9**	***2.6***	**30**	***1.3***	**4**	***1.8***
Australia and New Zealand	**16**	***0.3***	**2**	***0.2***	**8**	***0.5***	**1**	***0.3***	**5**	***0.2***	**0**	***0.0***

Degrees

	Bachelor degrees				Diplomas and Master degrees			
	2010 Total	2011 Total	Women	Foreigners	2010 Total	2011 Total	Women	Foreigners
ETH Zurich total	**1,283**	**1,304**	**387**	**211**	**1,275**	**1,506**	**477**	**477**
Programmes								
Architecture and Building Sciences	**294**	**304**	**101**	**40**	**201**	**238**	**89**	**49**
Architecture	181	175	81	27	87	124	59	38
Civil Engineering	65	77	9	5	54	56	11	7
Environmental Engineering	34	40	9	7	30	26	10	2
Geomatics and Planning	14	12	2	1	30	32	9	2
Rural Engineering and Surveying	0	0	0	0	0	0	0	0
Engineering Sciences	**392**	**411**	**39**	**75**	**415**	**475**	**62**	**166**
Mechanical Engineering	181	192	13	48	142	150	12	34
Information Technology and Electrical Engineering	96	88	3	13	79	88	4	21
Biosciences and Engineering	0	16	4	1	39	40	16	28
Interdisciplinary Engineering Sciences	0	0	0	0	38	64	12	33
Computer Science	88	76	8	10	95	99	11	39
Materials Science	27	39	11	3	22	34	7	11
Natural Sciences and Mathematics	**363**	**383**	**156**	**83**	**424**	**493**	**197**	**156**
Mathematics	45	44	11	14	53	71	11	32
Computational Science and Engineering	11	10	1	1	12	13	2	4
Physics	76	84	15	32	70	85	16	35
Chemistry	38	23	5	2	33	55	8	21
Chemical Engineering	13	15	1	9	21	19	7	9
Interdisciplinary Sciences	14	23	6	11	12	13	1	6
Pharmaceutical Sciences	53	67	51	6	54	53	47	12
Biology	48	58	30	5	98	109	58	36
Human Movement Sciences	65	59	36	3	71	75	47	1
System-oriented Natural Sciences	**218**	**185**	**91**	**13**	**173**	**207**	**100**	**48**
Earth Sciences	40	51	21	2	52	50	15	27
Environmental Sciences	112	73	31	8	80	87	44	15
Forest Sciences	0	0	0	0	0	0	0	0
Agricultural Sciences	26	22	11	1	14	30	14	1
Food Sciences	40	39	28	2	27	40	27	5
Management and Social Sciences	**16**	**21**	**0**	**0**	**62**	**93**	**29**	**58**
Management, Technology and Economics	0	0	0	0	57	79	21	50
Humanities, Social and Political Sciences	16	21	0	0	5	14	8	8

Doctorates

	2010 Total	2011 Total	Women	Foreigners
ETH Zurich total	**650**	**696**	**218**	**434**
Department				
Architecture and Building Sciences	**41**	**44**	**9**	**26**
Architecture	16	9	3	9
Civil, Environmental and Geomatic Engineering	25	35	6	17
Engineering Sciences	**205**	**204**	**44**	**130**
Mechanical Engineering	58	67	10	44
Information Technology and Electrical Engineering	76	61	12	38
Computer Science	32	40	8	27
Materials Science	36	30	11	17
Biosystems	3	6	3	4
Natural Sciences and Mathematics	**250**	**238**	**72**	**152**
Mathematics	14	24	3	11
Physics	57	53	9	32
Chemistry and Applied Biosciences	94	89	30	56
Biology	85	72	30	53
System-oriented Natural Sciences	**123**	**157**	**70**	**89**
Earth Sciences	20	32	13	21
Environmental Sciences	59	81	36	44
Agricultural and Food Sciences	44	44	21	24
Management and Social Sciences	**31**	**53**	**23**	**37**
Management, Technology and Economics	20	40	15	28
Humanities, Social and Political Sciences	11	13	8	9

Certificates of continuing education programmes

Continuing education programmes

The aim of continuing education Master programmes is to give greater depth or interdisciplinary breadth to specialist skills; they may lead to a change of profession.

	2010	2011		
	Total	Total	Women	Foreigners
ETH Zurich total	**174**	**203**	**84**	**102**
MAS Architecture	28	45	25	38
MAS Building Project Leadership	9	0	0	0
MAS Landscape Architecture	0	8	6	6
MAS Urban Design	12	23	12	22
MAS Hydraulic Engineering[1]	1	0	0	0
MAS in Natural Hazards Management	0	12	6	4
MAS Sustainable Water Resources	7	5	1	4
MAS Spatial Planning	1	16	7	2
MAS Medical Physics	11	4	2	2
MAS Nutrition and Health	5	12	11	6
MAS Work + Health	8	3	0	1
MAS Management, Technology and Economics	47	56	12	9
MBA Supply Chain Management	16	2	0	2
MAS Development and Cooperation	19	1	1	0
MAS Intellectual Property	8	2	1	2
MAS Security Policy and Crisis Management	2	14	0	4

[1] The MAS in Hydraulic Engineering is offered in cooperation with EPF Lausanne; participants are enrolled at EPF Lausanne.

Continuing education certificates and diplomas

The aim of certificate and diploma courses is to give greater depth or interdisciplinary breadth to specialist skills. They are intended for university graduates who are in employment and are seeking further professional development or specialisation.

Continuing education certificates	108	124	78	47
Continuing education diplomas	2	28	12	3

Teacher training

The following diplomas and certificates certify graduation from a teacher training course.

Certificate of Teaching Ability	199	95	38	12
Teaching diplomas for grammar schools/MAS SHE	22	34	16	2
Teaching Certificate	15	23	15	4

Staff by discipline

The number of staff is shown in full-time equivalents (FTE) as at the end of the year and is based on the current organisational structure at ETH Zurich as of 31 December 2011, even for the previous year.
The breakdown by discipline reflects an internal management point of view. For internal cost control purposes, expenditure is divided into three categories: core and additional finances, which comes mainly from the federal financial contribution; other funds, financed entirely by third parties.

	2010			2011		
	Total	Core and additional finances	Other funds	Total	Core and additional finances	Other funds
Grand total	**7,283.6**	**5,548.3**	**1,735.3**	**7,501.1**	**5,600.4**	**1,900.7**
Total teaching and research	**6,233.0**	**4,520.8**	**1,712.2**	**6,431.2**	**4,557.8**	**1,873.5**
Departments	**6,058.4**	**4,402.3**	**1,656.2**	**6,237.4**	**4,435.4**	**1,802.0**
Architecture and Building Sciences	**829.1**	**668.8**	**160.3**	**880.7**	**726.1**	**154.7**
Architecture	345.2	307.0	38.2	392.6	348.2	44.4
Civil, Environmental and Geomatic Engineering	483.9	361.8	122.1	488.2	377.9	110.3
Engineering Sciences	**1,771.5**	**1,235.4**	**536.2**	**1,823.7**	**1,240.0**	**583.7**
Mechanical Engineering	591.6	419.9	171.8	621.8	388.9	232.9
Information Technology and Electrical Engineering	469.7	306.5	163.1	488.3	334.4	153.9
Computer Science	364.1	263.3	100.9	351.5	259.5	92.1
Materials Science	211.4	155.5	56.0	206.3	155.4	50.8
Biosystems	134.7	90.2	44.5	155.8	101.9	53.9
Natural Sciences and Mathematics	**1,985.3**	**1,484.9**	**500.4**	**2,070.0**	**1,481.1**	**589.0**
Mathematics	235.9	184.1	51.8	229.8	178.2	51.7
Physics	506.8	393.5	113.3	549.7	415.6	134.1
Chemistry and Applied Biosciences	661.0	513.4	147.6	688.7	508.7	180.0
Biology	581.6	393.9	187.6	601.8	378.6	223.2
System-oriented Natural Sciences	**979.2**	**700.6**	**278.6**	**961.6**	**669.9**	**291.7**
Earth Sciences	260.7	162.3	98.4	249.4	151.0	98.4
Environmental Sciences	395.2	312.1	83.1	384.8	290.4	94.4
Agricultural and Food Sciences	323.3	226.2	97.1	327.4	228.5	98.9
Management and Social Sciences	**493.3**	**312.5**	**180.7**	**501.4**	**318.4**	**183.0**
Management, Technology and Economics	264.5	185.0	79.5	274.2	191.5	82.7
Humanities, Social and Political Sciences	228.8	127.5	101.2	227.2	126.8	100.3
Extra-departmental teaching and research units, others[1]	**174.5**	**118.5**	**56.0**	**193.8**	**122.4**	**71.4**
CSCS Manno	47.5	41.3	6.2	50.1	43.6	6.5
Functional Genomics Center Zürich	13.5	12.2	1.3	15.4	14.4	1.0
Swiss Seismological service (SED)	57.4	22.7	34.7	65.9	20.3	45.6
Further teaching and research units, others	56.3	42.4	13.9	62.5	44.2	18.3
Total Executive Board, central authorities and infrastructure divisions	**1,050.6**	**1,027.5**	**23.2**	**1,069.8**	**1,042.6**	**27.2**
Infrastructure divisions	902.6	894.1	8.5	914.9	903.9	11.0
Central authorities and other staff	148.1	133.4	14.7	154.9	138.7	16.2

[1] This groups together the research units as described in the ordinance concerning the organisation of ETH Zurich and further teaching and research units.

Staff by function

	2010	2011		Change from previous year	
	Total	Total	*Percentage Women*	in FTE	*in %*
Grand total	**7,283.6**	**7,501.1**	***31.2***	**217.5**	***3.0***
of which temporary positions	5,007.8	5,180.6	*30.6*	172.7	*3.4*
Total teaching and research	**6,233.0**	**6,431.2**	***29.9***	**198.3**	***3.2***
of which temporary positions	4,844.2	5,014.1	*29.9*	169.9	*3.5*
Professorships	408.8	424.2	*11.9*	15.4	*3.8*
Full/Associate professorships	344.4	349.9	*8.3*	5.5	
Assistant professorships	64.5	74.3	*29.0*	9.9	
Scientific Staff	4,475.5	4,639.3	*27.1*	163.8	*3.7*
Senior Scientists and permanent scientific staff	247.2	244.8	*11.1*	–2.5	
Senior assistants and temporary scientific staff	486.3	521.0	*21.5*	34.7	
Scientific research assistants II and post doctoral students	1,019.3	1,047.2	*29.2*	27.9	
Scientific research assistants I	2,432.8	2,552.1	*28.2*	119.3	
Teaching/research assistants	289.9	274.3	*33.8*	–15.6	
Technical and administrative staff	1,226.7	1,242.8	*46.1*	16.1	*1.3*
Technical and IT staff	763.8	767.0	*24.1*	3.2	
Administrative staff	462.9	475.7	*81.4*	12.9	
Apprentices	122.0	125.0	*31.2*	3.0	*2.5*
Total Executive Board, central authorities and infrastructure divisions*	**1,050.6**	**1,069.8**	***39.5***	**19.2**	***1.8***
of which temporary positions	162.0	164.4	*52.9*	2.4	*1.5*
Professorships	4.0	4.0	*25.0*	0.0	
Scientific staff	3.9	4.6	*23.9*	0.7	
Technical and IT staff	479.7	469.5	*13.1*	–10.2	
Administrative staff	535.0	563.7	*61.1*	28.7	
Apprentices	28.0	28.0	*50.0*	0.0	

***Staff in infrastructure divisions**	**902.6**	**914.9**	***37.4%***	**12.3**	***1.4%***
Corporate communications	27.3	25.3	*49.9%*	–2.0	*–7.4%*
Rectorate	58.8	62.9	*68.2%*	4.1	*7.0%*
Library	193.4	202.7	*58.7%*	9.3	*4.8%*
Finance and controlling	65.9	71.4	*39.9%*	5.5	*8.3%*
Real estate	252.5	249.1	*24.8%*	–3.4	*–1.4%*
IT services	198.7	198.7	*16.0%*	–0.1	*0.0%*
Human resources and services	106.0	104.9	*43.7%*	–1.1	*–1.0%*

Overall view of expenditure

The table "Origin expenditure" shows the financial sources of ETH Zurich. The tables "Expenditure by use" and "Expenditure by discipline" (see next page) reflect an internal management point of view. For internal cost control purposes, expenditure is divided into three categories: core and additional finances, which comes mainly from the federal financial contribution; other funds, financed entirely by third-parties.

in CHF 1,000

Origin expenditure	2007	2008	2009	2010	2011	*Change from previous year in %*
Total expenditure	**1,217,086**	**1,263,802**	**1,306,889**	**1,359,255**	**1,454,762**	***7.0***
Federal financial contribution (income)	965,471	1,001,401	1,039,343	1,094,189	1,088,947	*–0.5*
Advance funding for implementation of the HPCN strategy/ new CSCS building				–12,355	12,355	
Federal financial contribution (expenditure)	**965,471**	**1,001,401**	**1,039,343**	**1,081,834**	**1,101,302**	***1.8***
Expenditure of third-party resources	**251,615**	**262,401**	**267,546**	**277,421**	**353,460**	***27.4***
National funding agencies (research sponsorship)	70,876	76,067	86,280	99,122	101,042	*1.9*
Research contracts from federal offices (federal research contracts)	20,912	23,140	23,443	22,873	22,781	*–0.4*
European research programmes (Framework Programmes)	26,929	34,042	37,245	42,914	40,019	*–6.7*
Partnerships with business, other third-party funding	93,888	73,759	92,842	99,668	166,328	*66.9*
Endowments and legacies	39,011	55,393	27,736	12,845	23,290	*81.3*

Expenditure by use

Total expenditure	**1,217,086**	**1,263,802**	**1,306,889**	**1,359,255**	**1,454,762**	***7.0***
Overall expenditure (excl. investment)	1,036,018	1,079,783	1,136,366	1,168,367	1,181,020	*1.1*
Personnel expenses	740,641	764,838	827,433	859,042	890,991	*3.7*
Materials expenses	295,377	314,945	308,932	309,325	290,029	*–6.2*
Investment expenses	181,068	184,019	170,523	190,888	273,742	*43.4*
Investment credit/co-financing (FBL)[1]	108,515	109,960	79,960	100,000	104,600	*4.6*
Movables, machinery, vehicles, IT equipment	72,553	74,059	90,563	90,888	169,142	*86.1*
Basic funding and supplementary funding	**1,001,715**	**1,011,833**	**1,050,424**	**1,085,906**	**1,154,601**	***6.3***
Overall expenditure (excl. investment)	847,159	863,240	896,455	911,088	893,736	*–1.9*
Personnel expenses	618,134	627,069	672,287	687,488	701,005	*2.0*
Materials expenses	229,025	236,171	224,168	223,600	192,730	*–13.8*
Investment expenses	154,556	148,593	153,969	174,819	260,865	*49.2*
Investment credit (FBL)[1]	93,515	86,400	79,960	100,000	104,000[2]	*4.0*
Movables, machinery, vehicles, IT equipment	61,041	62,193	74,009	74,819	156,865	*109.7*
Other resources	**215,371**	**251,969**	**256,465**	**273,348**	**300,161**	***9.8***
Overall expenditure (excl. investment)	188,859	216,543	239,911	257,279	287,284	*11.7*
Personnel expenses	122,507	137,769	155,147	171,554	189,986	*10.7*
Materials expenses	66,353	78,774	84,765	85,724	97,298	*13.5*
Investment expenses	26,512	35,425	16,554	16,069	12,876	*–19.9*
Co-financing (FBL)[1]	15,000	23,560	0	0	600	
Movables, machinery, vehicles, IT equipment	11,512	11,865	16,554	16,069	12,276	*–23.6*

[1] FBL = Federal Office for Buildings and Logistics, BBL.

[2] Of the investment credit in 2011, CHF 66 million was for capitalisable expenses, CHF 38 million was spent on maintenance and repairs.

in CHF 1,000	2011				Use of funds by type of expenditure		
Expenditure by discipline	Total	Core finances	Additional finances	Other funds	Personnel	Materials	Invest-ments
Grand total	**1,454,762**	**1,011,677**	**142,924**	**300,161**	**890,991**	**290,029**	**273,742**
Total teaching and research	**917,401**	**566,903**	**88,169**	**262,329**	**709,052**	**145,220**	**63,129**
Departments	**854,091**	**527,379**	**79,935**	**246,777**	**683,509**	**129,131**	**41,451**
Architecture and Building Sciences	**113,794**	**79,911**	**9,278**	**24,604**	**95,514**	**15,959**	**2,321**
Architecture	51,249	38,362	4,538	8,349	42,481	7,889	879
Civil, Environmental and Geomatic Engineering	62,544	41,549	4,740	16,255	53,032	8,070	1,442
Engineering Sciences	**240,232**	**149,844**	**20,171**	**70,216**	**189,389**	**34,022**	**16,821**
Mechanical Engineering	73,510	40,726	6,822	25,962	60,751	8,689	4,070
Information Technology and Electrical Engineering	62,692	36,020	7,794	18,878	50,552	6,527	5,612
Computer Science	44,349	30,944	2,113	11,291	39,594	4,563	193
Materials Science	29,074	17,909	3,323	7,842	22,813	4,644	1,617
Biosystems	30,606	24,245	119	6,243	15,679	9,598	5,329
Natural Sciences and Mathematics	**295,538**	**177,290**	**33,968**	**84,280**	**226,639**	**49,968**	**18,930**
Mathematics	34,302	24,925	2,996	6,382	31,853	2,425	24
Physics	76,738	47,147	7,798	21,794	57,002	13,321	6,416
Chemistry and Applied Biosciences	97,165	59,640	13,515	24,010	72,830	16,909	7,427
Biology	87,331	45,578	9,660	32,093	64,955	17,314	5,062
System-oriented Natural Sciences	**139,848**	**84,857**	**13,922**	**41,069**	**114,859**	**21,655**	**3,334**
Earth Sciences	39,080	19,692	5,688	13,700	31,331	6,611	1,138
Environmental Sciences	55,241	37,909	5,291	12,041	47,465	7,000	776
Agricultural and Food Sciences	45,528	27,256	2,943	15,328	36,064	8,044	1,420
Management and Social Sciences	**64,680**	**35,477**	**2,595**	**26,608**	**57,108**	**7,527**	**45**
Management, Technology and Economics	32,129	18,055	1,142	12,933	29,414	2,701	14
Humanities, Social and Political Sciences	32,550	17,422	1,454	13,675	27,693	4,826	31
Extra-departmental teaching and research units, others	**63,310**	**39,524**	**8,234**	**15,552**	**25,544**	**16,089**	**21,678**
Total Executive Board, central authorities, infrastructure divisions and building investments	**537,360**	**444,775**	**54,755**	**37,831**	**181,939**	**144,809**	**210,613**
Executive Board, central authorities and infrastructure divisions	432,760	340,775	54,755	37,231	181,939	144,809	106,013
Investment credit/co-financing (FBL)[1]	104,600	104,000	0	600	0	0	104,600

[1] FBL = Federal Office for Buildings and Logistics, BBL.

Environmental statistics

ETH Zurich has an modern system for measuring energy data. As soon as one consumer's figures vary too widely from the norm, specific analysis processes can be launched and measures taken very quickly. By looking at long-term trends, it is possible to detect changes in consumption or to assess and monitor the effectiveness of new supply systems.
Even though energy consumption in the buildings again increased a little in 2011, overall energy consumption was slightly down. The much milder weather in 2011 compared with the previous year was the main reason for the drop in the consumption of energy for heating. CO_2 emissions were also slightly down on the previous year. In particular, fewer direct emissions were generated, which are caused for example by the burning of fossil fuels on the campus.

	2007	2008	2009	2010	2011
Electricity	GWh				
Total electricity consumption	**102.5**	**107.9**	**109.8**	**113.1**	**111.0**
Total produced on site	**4.0**	**6.2**	**3.5**	**2.3**	**1.1**
Production from combined heat and power unit (CHP)	3.8	6.0	3.3	2.1	0.9
Production from photovoltaic cells	0.2	0.2	0.2	0.2	0.2
Total electricity purchased	**98.5**	**101.7**	**106.3**	**110.8**	**109.9**
Electricity purchased for buildings	87.9	89.3	94.0	96.6	98.5
Electricity purchased for Walche heat pump	10.6	12.4	12.3	14.2	11.4
Heating	GWh				
Total heat consumption of ETH Zurich (net energy)	**58.8**	**54.8**	**52.8**	**51.1**	**45.3**
Total heat produced (net energy)	83.8	82.9	80.7	81.9	70.7
Sale of heat to third-parties (net energy)	–25.0	–28.1	–27.9	–30.8	–25.4
Total heat produced (net energy incl. external purchasers)	**83.8**	**82.9**	**80.7**	**81.9**	**70.7**
District heating	15.7	16	16.7	11.7	11.2
Walche heat pump	28.2	30.8	26.4	33.9	31.5
Fossil fuels					
Gas (excl. gas for CHP electricity)	48.3	40.0	40.4	38.5	26.6
Oil	0	0	0	0	4.2
Non-fossil fuels					
Woodchips	0.5	0.6	0.7	0.7	0.5
From heat recovery	4.7	9.6	6.8	6.6	7.9
Losses during conversion	–13.6	–14.1	–10.2	–9.5	–11.1
Relative amounts[1]					
Electricity consumption [kWh/FTE], excl. power for heat pump	6,841.6	6,681.9	6,391.7	6,176.1	5,880.7
Heat consumption/energy-consuming area [kWh/m²]	101.4	88.5	84.8	82.5	73.1
Total energy consumption/FTE [kWh/FTE]	11,219.5	10,516.1	9,852.7	9,369.3	8,554.9
Total energy consumption/energy-consuming area [kWh/m²]	259.9	242.6	241.5	242.0	233.9
Emissions of CO_2 equivalents	Tonnes CO_2 eq.				
Total CO_2 eq. emissions	**21,421**	**23,613**	**23,902**	**25,258**	**23,652**
Direct CO_2 eq. emissions					
Gas and district heating	8,853	8,840	8,178	7,806	4,937
Oil	0	0	0	0	1,109
Coolants (recorded once in 2009)	n.a.	n.a.	62	62	62
Indirect CO_2 eq. emissions					
Purchased current	1,316	1,377	1,445	1,462	1,609
Commuter traffic (recorded once in 2008)	n.a.	1,714	1,714	1,714	1,714
Business travel	11,252	11,682	12,503	14,214	14,221

[1] Students count as 0.68 FTE.

Research sponsorship and knowledge transfer

ETH Zurich participates successfully in national and international research funding programmes. Depending on the resources available and the quality of the applications, the research funding organisations approve between 10 and 40 percent of the projects that are submitted. In the ever tougher competition for external funding, ETH Zurich enjoys an above-average success rate compared with other universities. *Ambizione* is a scheme to support talented young scientists (advanced post-docs) at Swiss universities. EU grants to central bodies (research generally, CSCS) are not included (2010 CHF 1.2 million, 2011 CHF 0.5 million). The sharp fall in approved EU funding – when converted into Swiss francs – is largely due to the poorer exchange rate; also, the grants are not yet known for all the approved projects.

Approved research projects in 2011

in CHF 1,000	Architecture and Civil Engineering 2011	Engineering Sciences 2011	Natural Sciences and Mathematics 2011	System-oriented Natural Sciences 2011	Management and Social Sciences 2011	Total 2010	Total 2011
Swiss National Science Foundation (SNSF)							
Total SNSF	**5,724**	**18,626**	**46,789**	**16,413**	**2,617**	**89,073**	**90,168**
Project sponsorship	**4,026**	**11,576**	**29,253**	**8,252**	**1,641**	**59,438**	**54,748**
Individual sponsorship	**493**	**2,848**	**9,848**	**6,582**	**472**	**16,748**	**20,243**
of which SNSF-sponsored professorships		1,523	3,764	4,421		10,103	9,708
of which Ambizione	405	599	2,022	1,356		5,449	4,382
Programme-based research	**1,192**	**4,068**	**7,470**	**1,379**	**441**	**12,314**	**14,550**
International cooperation, infrastructure, etc.	**12**	**135**	**218**	**199**	**63**	**573**	**627**
Commission for Technology and Innovation (CTI)							
Project sponsorship incl. contribution from industry	**5,198**	**30,214**	**7,476**	**3,407**	**4,260**	**44,255**	**50,555**
Engineering Sciences	2,096	14,774		2,030		18,491	18,899
Nano- and Microtechnologies		3,322	1,351			7,244	4,673
Life Sciences		7,228	6,125	1,377		11,003	14,730
Enabling Sciences	3,103	4,889			4,260	7,517	12,252
Research sponsorship under the 7th EU Framework Programme							
Total EU	**819**	**23,353**	**22,534**	**5,030**	**3,087**	**73,122**	**54,824**
Cooperation	**426**	**9,016**	**4,146**	**4,198**	**595**	**20,863**	**18,381**
Health			1,047			2,247	1,047
Food, Agriculture and Biotechnology		1,778	479	924		1,454	3,181
ICT		3,399	1,412		595	14,080	5,406
NanoMatPro		1,004	363				1,367
Energy		688	218			937	906
Environment	426			3,274		1,129	3,700
Transport, Security		2,147	249			749	2,396
ERANET			378			267	378
Ideas		**12,075**	**14,179**		2,491	**36,282**	**28,746**
ERC Advanced Grant		10,300	4,324		2,491	22,379	17,116
ERC Starting Grant		1,775	9,855			13,903	11,630
Capacity			**387**				**387**
Research infrastructures			387			3,188	387
People	**393**	**2,262**	**3,822**	**833**			**7,310**
People/Marie Curie Actions	393	2,262	3,822	833		12,789	7,310

Technology transfer statistics

	2006	2007	2008	2009	2010	2011
Number of spin-offs	16	21	23	24	20	22
Patents registered	84	79	64	78	63	72
Cooperation agreements (> CHF 50,000)	196	223	204	240	292	285

Honours and prizes for members of ETH

A

Prof. Dr. Rudolf Aebersold, D-BIOL, MCP-HUPO Award, Leadership, Human Proteome Organisation (HUPO), Quebec, Canada

Prof. Dr. Göran Andersson, D-ITET, George Montefiore International Award, Montefiore Institute, Liège, Belgium

Prof. Dr. Marc Angélil, D-ARCH, SIA Award Umsicht 2011 (for Prudence in Construction), Swiss Society of Engineers and Architects (SIA), Zurich, Switzerland

B

Prof. Dr. David Basin, D-INFK, IBM Open Collaborative Faculty Award, IBM Almaden Research Center, Armonk, New York, NY, USA

Prof. Dr. Yakoov Benenson, D-BSSE, ERC Starting Grant, European Research Council, Brussels, Belgium

Prof. Dr. Arnold Benz, D-PHYS, Honorary doctor, Theological Faculty of the University of Zurich, Zurich, Switzerland

Dr. Gonçalo Bernardes, D-CHAB, Prémio Empreendedorismo Inovador na Diáspora Portuguesa, Governo português, Lisbon, Portugal

Prof. Dr. Thomas Bernauer, D-GESS, ERC Advanced Grant, European Research Council, Brussels, Belgium

Prof. Dr. Jeffrey W. Bode, D-CHAB, Elias J. Corey Award for Outstanding Original Contribution, American Chemical Society, Washington, DC, USA

Dr. Enrica Bordignon, D-CHAB, IES Young Investigator Award 2011, International EPR (ESR) Society, USA

Prof. Alfredo Brillembourg, D-ARCH, Prof. Hubert Klumpner, Holcim Award Gold 2011 Latin America, Holcim Foundation, Zurich, Switzerland

Prof. Dr. Peter L. Bühlmann, D-MATH, 5th Pao Lu Hsu Lecture, Beijing University and Microsoft Research Asia, Beijing, China

C

Prof. Gion A. Caminada, D-ARCH, Graubünden Culture Prize, Government of the Canton of Graubünden, Chur, Switzerland;

SIA Award Umsicht 2011 (for Prudence in Construction), Swiss Society of Engineers and Architects (SIA), Zurich, Switzerland

Prof. Adam Caruso, D-ARCH, Civic Trust Award, Newton-le-Willows, UK;

Mies van der Rohe Award, European Commission, European Parliament and Mies van der Rohe Foundation, Barcelona, Spain;

Royal Institute of British Architects Award (RIBA), London, UK;

RIBA London & English Heritage Award, London, UK

Prof. Dr. François Cellier, D-INFK, full individual member, Swiss Academy of Engineering Sciences (SATW);

SCS McLeod Founder's Award for Distinguished Service to the Profession, Society for Modeling & Simulation International, Vista, CA, USA

Prof. Dr. Peter Chen, D-CHAB, Karl Ziegler Lecture, Max Planck Institute for Coal Research, Mülheim, Germany

Prof. Dr. Demetrios Christodoulou, D-MATH, Shaw Prize in Mathematical Sciences, Shaw Foundation, Hong Kong, China;

Honorary Professor of Physics, Physics Department, University of Crete, Rethymnon, Greece

Prof. Dr. James Connolly, D-ERDW, Bowen Award 2011, American Geophysical Union, Washington, DC, USA

Prof. Dr. Christophe Copéret, D-CHAB, Nobel Celebration Symposium, Purdue University, West Lafayette, IN, USA

D

Prof. Dr. Emanuela Del Gado, D-BAUG, Research Group Profile, Engineering Mechanics Institute (American Society of Civil Engineers), Reston, VA, USA

Prof. Dr. François Diederich, D-CHAB, J. T. Donald Lecturer, McGill University, Quebec, Canada;

Merk-Karl Pfister Lectures in Organic Chemistry, Massachusetts Institute of Technology (MIT), Cambridge, MA, USA;

Adolf von Baeyer Medal, German Chemical Society (GDCh), Frankfurt am Main, Germany

E

Prof. Dr. Peter H. Egger, D-MTEC, Gossen Prize, Frankfurt, Germany

Prof. Dr. Manuel P. Eisner, D-GESS, Sellin-Glueck Award, American Society of Criminology, Columbus, OH, USA

Philipp Elbert, D-MAVT, Hansjörg Gisler and Prof. Dr. Lino Guzzella, European Satellite Navigation Competition (ESNC)/Regional Switzerland Award, Anwendungszentrum GmbH, Oberpfaffenhofen, Germany

Prof. Dr. Paul Embrechts, D-MATH, Award for Excellence in Statistical Research, University of Hasselt, Diepenbeek, Belgium;

Doctor honoris causa, Heriot-Watt University Edinburgh, Edinburgh, UK

Prof. Tom Emerson, D-ARCH, New London Architecture Award, New London Architecture, London, UK;

Royal Institute of British Architects Award (RIBA), London, UK

Dr. Kynan Eng, D-BIOL, ZKB Technopark Pioneer Award, spin-off company YouRehab AG, Technopark Foundation, Zurich, Switzerland

F

Matthew Faulkner, D-INFK, Demetriades-Tsafka-Kokkalis Prize in Seismo-Engineering, Prediction and Protection, Caltech Division of Engineering and Applied Science, Pasadena, CA, USA

Andrea Francke, D-INFK, Fulbright Foreign Student Grant 2011/12, Fulbright Foundation, Washington, DC, USA

Prof. Dr. Martin Fussenegger, D-BSSE, Dr. Marc Gitzinger and Dr. Marcel Tigges, Swiss Technology Award, "Start-up" category, Swiss Innovation Forum, Gwatt (Thun), Switzerland

Demetrios Christodoulou, Professor of Mathematics and Physics, has won one of the highest awards for mathematicians – the well-endowed Shaw Prize for Mathematics.

G

Dr. Daniel Gerlich, D-BIOL, ERC Starting Grant, European Research Council, Brussels, Belgium

Hansjörg Gisler, D-ITET, Philipp Elbert and Prof. Dr. Lino Guzzella, European Satellite Navigation Competition (ESNC)/Regional Switzerland Award, Anwendungszentrum GmbH, Oberpfaffenhofen, Germany

Prof. Dr. Gaston Gonnet, D-INFK, the 2011 Richard D. Jenks Memorial Prize, Association for Computing Machinery/Special Interest Group on Symbolic and Algebraic Manipulation, New York, NY, USA

Prof. Fabio Gramazio, D-ARCH, Prof. Matthias Kohler, Silvan Oesterle and Axel Vansteenkiste, Holcim Award 2011, Holcim Foundation for Sustainable Construction, Zurich, Switzerland

Friederike Gross, D-ARCH, Award of Excellence, Society for News Design annual creative competition, Orlando, FL, USA

Prof. Dr. Markus Gross, D-INFK, membership of Leopoldina, Leopoldina National Academy of Sciences, Halle, Germany;

Swiss ICT Champion, Swiss ICT, Zurich, Switzerland

Prof. Dr. Hansjörg Grützmacher, D-CHAB, 23rd Egon-Wiberg Lecture, Ludwig Maximilians University Munich, Germany

Utku Gülan, D-BAUG, Young Investigator Award, International Federation for Medical and Biological Engineering, Paris, France

Prof. Dr. Lino Guzzella, D-MAVT, Philipp Elbert and Hansjörg Gisler, European Satellite Navigation Competition (ESNC)/Regional Switzerland Award, Anwendungszentrum GmbH, Oberpfaffenhofen, Germany

H

Prof. Dr. Willi H. Hager, D-BAUG, Environmental Hydraulics Visiting Fellowship, Lifetime Achievement Award, Hong Kong, University of Science and Technology, Hong Kong, China

Prof. Dr. Michael Hagner, D-GESS, membership of Leopoldina, Leopoldina National Academy of Sciences, Halle, Germany

Prof. Dr. Ari Helenius, D-BIOL, Heinrich Pette Lecture, Heinrich Pette Institute, Hamburg, Germany;

Severo Ochoa Lecture, University of Madrid, Madrid, Spain;

the Annual Sackler Lecture, Massachusetts Institute of Technology, Cambridge, MA, USA

Dr. Anke Henning, D-ITET, appointed Assistant Professor, Max Planck Institute for Biological Cybernetics, Tübingen, Germany

Prof. Dr. Andreas Hierlemann, D-BSSE, Dechema Award, DECHEMA Society for Chemical Engineering and Biotechnology, Frankfurt am Main, Germany

Prof. Dr. Donald Hilvert, D-CHAB, Doctor of Philosophy honoris causis, Uppsala University, Uppsala, Sweden;

honorary lifetime membership, Israel Chemical Society, Israel

Prof. Dr. Lorenz Hurni, D-BAUG, Dr. Hans-Rudolf Bär, Juliane Cron, Dr. Christian Häberling, Thomas Koblet, Robin Loop, Philipp Marty, Christian Omlin, Sascha Thöni, Adrian Weber, Stephan Wondrak, Prix Carto, Swiss Society of Cartography SGK, Wabern, Switzerland

I

Dr. Michael Iten, D-BAUG, Venture Leaders, Swissnex Boston, Boston, MA, USA

J

Prof. Dr. Sebastian Jessberger, D-ARCH, EMBO Young Investigator Award, Heidelberg, Germany

K

Prof. Dr. Ansgar Kahmen, D-AGRL, ERC Starting Grant, European Research Council, Brussels, Belgium;

BASIN Young Investigator Award, Keystone, CO, USA

Dr. Ilya Karlin, D-MAVT, ERC Advanced Grant, European Research Council, Brussels, Belgium

Prof. Dr. Helmut Katzgraber, D-PHYS, NSF CAREER Award, National Science Foundation, Arlington, VA, USA

Prof. Dr. Boris Kaus, D-ERDW, EGU Arne Richter Award, European Geosciences Union (EGU), Munich, Germany

Prof. Dr. Ursula Keller, D-PHYS, EPS Senior Prize for Applied Aspects of Quantum Electronics and Optics, European Physical Society, Mulhouse, France

Prof. Dr. James W. Kirchner, D-UWIS, Fellow of the Centre for Ecology and Hydrology (CEH), CEH, Wallingford, UK;

Honorary Professor, Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang, China

Prof. Hubert Klumpner, D-ARCH, Prof. Alfredo Brillembourg, Holcim Award Gold 2011 Latin America, Holcim Foundation, Zurich, Switzerland

Prof. Matthias Kohler, D-ARCH, Prof. Fabio Gramazio, Silvan Oesterle and Axel Vansteenkiste, Holcim Award 2011, Holcim Foundation for Sustainable Construction, Zurich, Switzerland

Prof. Dr. Benoît Kornmann, D-BIOL, SNSF-sponsored professorship, Swiss National Science Foundation (SNSF), Bern, Switzerland

Prof. Dr. Petros Koumoutsakos, D-INFK, NVIDIA Research Center Award, NVIDIA, Santa Clara, CA, USA

Prof. Dr. Wolfgang Kröger, D-MAVT, Distinguished Affiliated Professor TU Munich 2011, Technical University of Munich, Munich, Germany

L

Dr. Silvio Lorenzetti, D-MAVT, the Antarctica Service Medal of the United States of America, National Science Foundation, Arlington, VA, USA

Prof. Dr. Mathieu Luisier, D-ITET, ACM Gordon Bell Prize Honorable Mention, Association for Computing Machinery (ACM), New York, NY, USA

Prof. Dr. John Lygeros, D-ITET, Fellow of the IEEE, Contributions to hybrid and stochastic systems and applications, IEEE, USA

M

Prof. Dr. Vittorio Magnago Lampugnani, D-ARCH, CICA Bruno Zevi Book Award 2011, the International Committee of Architectural Critics, Kassel, Germany

Prof. Dr. Isabelle Mansuy, D-BIOL, Chevalier de L'Ordre National du Mérite, Grande Chancellerie de la Legion d'honneur France, Paris, France

Prof. Dr. Josep Lluis Mateo, D-ARCH, Aplus Award 2011, Grupo Via Magazine, Barcelona, Spain;

V NAN Award 2011 – Nan Construccion-TPI Grupo, PGGM, Zeist, Netherlands

Dr. Edit Mátyus, D-CHAB, 2011 Junior Prima Prize in the Hungarian Science category, Prima Primissima Foundation, Hungary

Prof. Dr. Kristopher McNeill, D-UWIS, Fellow of the Royal Society of Chemistry, Royal Society of Chemistry, London, UK

Prof. Dr. Patrick Meraldi, D-BIOL, Dr. Ernst Th. Jucker Prize, Dr. Ernst Th. Jucker Foundation, Thalwil, Switzerland;

Walther-Flemming Medal, German Society for Cell Biology, Heidelberg, Germany

Prof. Dr. Bertrand Meyer, D-INFK, ERC Advanced Grant, European Research Council, Brussels, Belgium

Prof. Dr. Raffaele Mezzenga, D-AGRL, John H. Dillon Medal, American Physical Society, College Park, MD, USA;

Young Scientist Research Award, AOCS, Urbana, IL, USA

Christian Monstein, D-PHYS, Giordano Bruno Memorial Award, SETI League, Little Ferry, NJ, USA

Prof. Dr. Manfred Morari, D-ITET, 2011 Richard E. Bellman Control Heritage Award, American Automatic Control Council, Dayton, OH, USA;

Fellow of the American Institute of Chemical Engineers (AIChE), AIChE, New York, NY, USA

N

Prof. Dr. Bradley J. Nelson, D-MAVT, Fellow of the IEEE, IEEE, USA;

ERC Advanced Grant, European Research Council, Brussels, Belgium

Prof. Dr. Dario Neri, D-CHAB, Prix Mentzer of the French Society for Medicinal Chemistry, Société de Chimie Thérapeutique (SCT), Châtenay-Malabry, France

Prof. Dr. David J. Norris, D-MAVT, Debye Lecturer, Debye Institute for Nanomaterials Science, Utrecht University, Utrecht, Netherlands

Michele Parrinello, Professor of Computational Science, was awarded the Marcel Benoist Prize for his computer-aided modelling in the field of molecular dynamics.

O

Silvan Oesterle, D-ARCH, Prof. Fabio Gramazio, Prof. Matthias Kohler and Axel Vansteenkiste, Holcim Award 2011, Holcim Foundation for Sustainable Construction, Zurich, Switzerland

P

Prof. Dr. Michele Parrinello, D-CHAB, Marcel Benoist Prize, Marcel Benoist Foundation, Bern, Switzerland;

Doctor of Science, honoris causa, King's College, London, UK

Alain Plattner, D-ERDW, Ulrich Schmucker Memorial, Ulrich Schmucker Memorial Trust, Frankfurt am Main, Germany

Prof. Dr. Marc Pollefeys, D-INFK, 2011 Google Research Award, Google Inc., Mountain View, CA, USA

Prof. Dr. Sotiris E. Pratsinis, D-MAVT, Senior Alexander von Humboldt Award, Alexander von Humbold Foundation, Bonn, Germany

Q

Prof. Dr. Martin Quack, D-CHAB, August Wilhelm von Hofmann Medal, German Chemical Society (GDCh), Frankfurt am Main, Germany;

ERC Advanced Grant, European Research Council, Brussels, Belgium

Olga Sorkine, Assistant Professor of Computer Science, won the leading prize for young researchers in the field of computer graphics, the Significant New Researcher Award 2011.

R

Prof. Dr. Renato Renner, D-PHYS, Aisenstadt Chair, Centre de Recherches Mathematiques, Montreal, Quebec, Canada

Prof. Dr. Robert Riener et al., D-MAVT, Eberhard Ketz Prize, Pro Humanis patronage organisation, Zihlschlacht, Switzerland

Dr. Christof Roduner, D-INFK, Nokia Calling All Innovators 1st Prize Category Winner, Nokia, Sunnyvale, CA, USA

Prof. Dr. Markus Rudin, D-ITET, Fellow of the Society, International Society of Magnetic Resonance in Medicine, Berkeley, CA, USA

S

Prof. Karin Sander, D-ARCH, Hans Thoma Prize 2011, Grand State Prize for Fine Arts in Baden-Württemberg, state of Baden-Württemberg, Stuttgart, Germany

Prof. Dr. Paul Schmid-Hempel, D-UWIS, appointed Adjunct Professor, University of Western Australia, Centre of Excellence in Plant Biology, Perth, Australia

Prof. Dr. Martin E. Schwab, D-BIOL, Paul Broca Lecture, French Society of Neuroscience, Bordeaux Cedex, France

Prof. Dr. Joseph Schwartz, D-ARCH, European Steel Design Award, European Convention for Constructional Steelwork (ECCS), Brussels, Belgium

Thomas Schwarz, D-MAVT, winner of the RWB Stephens Prize, International Congress on Ultrasonics (Gdańsk, Poland), Austria

Prof. Dr. Martin Schweizer, D-MATH, SFI Distinguished Service Senior Chair, Swiss Finance Institute (SFI), Zurich, Switzerland

Christian Seiler, D-CHAB, SCS Metrohm Prize, Swiss Chemical Society (SCS)/Metrohm Schweiz AG, Bern, Switzerland

Prof. Dr. Manfred Sigrist, D-PHYS, Fellow of the American Physical Society, American Physical Society, College Park, MD, USA

Prof. Dr. Paul Smith, D-MATL, Dr. Jan Giesbrecht, Dr. Kirill Feldman, Prof. Dr. Jérôme Lefèvre, Prof. Han Meijer, Prof. Dr. Theo Tervoort and Dr. Willem D. Weenink, Nolax Incentive Prize, Nolax AG, Sempach, Switzerland

Suzanne Song, D-INFK, Hurst Song Architects, Best Architects Award 2011, Best Architects Award, Düsseldorf, Germany

Prof. Dr. Olga Sorkine, D-INFK, Significant New Researcher Award, ACM SIGGRAPH, New York, NY, USA

Prof. Dr. Didier Sornette, D-MTEC, Colloquium Ehrenfestii, Leiden, Lorentz Institute for Theoretical Physics, LION, Leiden University, Leiden, Netherlands

Prof. Dr. Nicola Spaldin, D-MATL, ERC Advanced Grant, European Research Council, Brussels, Belgium;

MRS Fellow 2011 of the Materials Research Society (MRS), MRS, Warrendale, PA, USA

Prof. Dr. Nicholas D. Spencer, D-MATL, membership of the Swiss Academy of Engineering Sciences (SATW), Zurich, Switzerland

Prof. Dr. Sarah Springman, D-MAVT, Commander of the Most Excellent Order of the British Empire CBE, the British Monarchy, London, UK

Prof. Dr. Aldo Steinfeld, D-MAVT, Golden Idea Award, Swiss Society for Ideas and Innovation Management, Zurich, Switzerland

Dr. Martino Stierli, D-ARCH, Federal Prize for Art/Swiss Art Award 2011, Federal Office of Culture, Bern, Switzerland

Dr. Natalie Stingelin, D-MATL, ERC Starting Grant, European Research Council, Brussels, Belgium

Prof. Dr. Markus Stoffel, D-BIOL, Steve Fajans Lecture, Merck, Darmstadt, Germany

Prof. Dr. Michael Strasser, D-ERDW, Hans Cloos Prize, Geological Society, Hamburg, Germany

T

Prof. Dr. Matthias Troyer, D-PHYS, ERC Advanced Grant, European Research Council, Brussels, Belgium;

Fellow of the American Physical Society, American Physical Society, College Park, MD, USA

V

Prof. Dr. Luc Van Gool, D-ITET, ERC Advanced Grant, European Research Council, Brussels, Belgium

Dr. Hervé Vanderschuren, D-BIOL, SFIAR Award, Swiss Forum for International Agricultural Research, Zollikofen, Switzerland

Prof. Dr. Joost VandeVondele, D-MATL, ERC Starting Grant, European Research Council, Brussels, Belgium

Axel Vansteenkiste, D-ARCH, Prof. Fabio Gramazio, Prof. Matthias Kohler and Silvan Oesterle, Holcim Award 2011, Holcim Foundation for Sustainable Construction, Zurich, Switzerland

Prof. Dr. Viola Vogel, D-MATL, Marie Curie Lecture, Chemistry as Innovating Science (CHAINS) Meeting, Amsterdam, Netherlands

Manuel Vogt, D-GESS, Knowledge Transfer Award, NCCR Democracy, Zurich, Switzerland

Prof. Dr. Georg von Krogh, D-MTEC, elected to the National Research Council SNSF, Swiss National Science Foundation (SNSF), Bern, Switzerland

W

Prof. Dr. Andreas Wallraff, D-PHYS, Max Rössler Prize, ETH Zurich Foundation, Zurich, Switzerland

Prof. Dr. Jing Wang, D-BAUG, Smoluchowski Award, Society for Aerosol Research (GAeF), Clausthal-Zellerfeld, Germany

Prof. Dr. Helma Wennemers, D-CHAB, Auer von Welsbach Lecture, Austrian Academy of Sciences, Vienna, Austria;

Novartis Chemical Science Lecture at Columbia University, Novartis/Columbia University, New York, NY, USA

Prof. Dr. Philipp Werner, D-PHYS, ERC Starting Grant, European Research Council, Brussels, Belgium

Prof. Dr. Kurt Wüthrich, D-BIOL, Cannizzaro Lecture, Società Chimica Italiana, Rome, Italy;

Honorary Visiting Professor, University of Essen-Duisburg, Duisburg, Germany;

Honorary Visiting Professor, City University, London, UK

Honours at the ETH Day 2011

Industry and foundation prizes

ABB Research Prize
Dr. Diego Rossinelli, D-INFK
"Multiresolution flow simulations on multi/many-core architectures"

Lorenz Meier, D-INFK
"Fast and robust localization and mapping on micro air vehicles"

Prize for the Advancement of Construction Management
Dr. David Lunze, D-BAUG
"Analysis of the prerequisites for life-cycle service provision in the construction industry"

Georg A. Fischer Prize
Dr. Lukas Durrer, D-MAVT
"Controlled single-walled carbon nanotube growth for sensing applications"

Heinrich Hatt-Bucher Prizes
Miguel Santiago Espitia Berndt, D-ARCH
"Grenzach-Wyhlen – a vision for regional infrastructure intervention"

Maria Sochitl Forster, D-ARCH
"An indoor market for Zurich"

Samuel Tobler, D-ARCH
"Arcade house – new building at Löwenstrasse 25"

Hilti Prize
Dr. Werner Escher, D-MAVT
"Ultra thin high efficiency heat sinks with water of nanofluid for electronics"

IBM Research Prize
Marco Schweizer, D-MATL
"Simulation of dissipative quantum systems"

Thomas Weymuth, D-CHAB
"Can Raman optical activity discriminate between different types of protein ß-turns?"

Plastics Technology Prize
Alexander Friedrich Fischer
"Development of a multi-stage polymeric nanoparticle drug delivery system"

Latsis Prize
Prof. Dr. Paola Picotti, D-BIOL
for her outstanding work in the field of proteomics, in particular for her contribution to the development of the high-sensitivity SRM method

Otto Jaag Water Protection Prize
Dr. Saskia Gisela Zimmermann, Eawag
"Enhanced wastewater treatment by ozone and ferrate: Kinetics, transformation products and full-scale ozonation"

Zurich Dissertation Prize
Dr. Stefania Vitali, D-MTEC
"Industrial organization from a geographical and network perspective – empirical investigation and formal modeling"

Golden Owl of the VSETH

The Golden Owl is a sympathy prize awarded to faculty members of ETH Zurich by the students. Each year, VSETH, ETH Zurich's student association, confers the award to particularly committed lecturers in appreciation of their excellent teaching. One person per department can be awarded the prize.

Prof. Dr. Martin Loessner, D-AGRL
Prof. Dr. Vittorio Magnago Lampugnani, D-ARCH
Dr. Peter Molnar, D-BAUG
Prof. Dr. Kevan A.C. Martin, D-BIOL
Prof. Dr. Dagmar Iber, D-BSSE
Prof. Dr. Donald Hilvert, D-CHAB
Dr. Sébastien Castelltort, D-ERDW
Prof. Dr. Frank Schimmelfennig, D-GESS
Prof. Dr. Timothy Roscoe, D-INFK
Prof. Dr. Johann Walter Kolar, D-ITET
Ulf Claesson, D-MTEC
Dr. Markus Kalisch, D-MATH
Prof. Dr. Nicholas Spencer, D-MATL
Prof. Dr. Lino Guzzella, D-MAVT
Prof. Dr. Renato Renner, D-PHYS
Prof. Dr. Jaboury Ghazoul, D-UWIS

Credit Suisse Award for Best Teaching
Prof. Dr. Donald Hilvert, D-CHAB

The new honorary councillor Dr. Eduard Rikli, ETH Rector Prof. Heidi Wunderli-Allenspach, the new honorary doctors Prof. Gerhard Wegner and Kazuo Okamoto (from left to right).

Honorary doctors at ETH Zurich

By awarding honorary doctorates, ETH Zurich honours individuals for their outstanding scientific work and recognises their important contribution to science, education and practical applications or to the synthesis of research and practical work.

The following were appointed honorary doctors at ETH Zurich in 2011:

Kazuo Okamoto,
in recognition of his essential contributions to innovative technologies for improving the safety, environmental performance and cost efficiency of vehicles.

Prof. emer. Dr. rer. nat. Dipl. Chem. Gerhard Wegner,
for his brilliant and creative contributions to polymer science, which have led to greater insight – highly valued worldwide – into the fundamental chemical and physical interactions in soft matter.

Honorary councillors at ETH Zurich

The title of honorary councillor honours individuals who support either key scientific work or areas of work at ETH Zurich, or the university as a whole.

The following was appointed an honorary councillor at ETH Zurich in 2011:

Dr. sc. techn., Dipl. Masch.-Ing. ETH Eduard Rikli,
in recognition of his continuing outstanding commitment and his successes in promoting cooperation between Swiss industry and the university.

New professors

Full professors

a) New appointments

Prof. Dr. Stefano Brusoni, for Technology and Innovation Management (1.6.2011), D-MTEC, formerly Associate Professor at the Bocconi University in Milan

Prof. Dr. Ingo Burgert, for Wood-based Materials (1.1.2011), D-BAUG, formerly head of a working group at the Max Planck Institute of Colloids and Interfaces in Potsdam

Prof. Adam Caruso, for Architecture and Construction (15.3.2011), D-ARCH, formerly partner at Caruso St John Architects LLP in London

Prof. Dr. Andrew deMello, for Biochemical Engineering (1.4.2011), D-CHAB, formerly Professor at Imperial College London

Prof. Dr. Stephen J. Ferguson, for Biomechanics (1.7.2011), D-MAVT, formerly Head of the Biomechanics Department at the University of Bern

Prof. Dr. Manfred Fiebig, for Multifunctional Ferroic Materials (1.8.2011), D-MATL, formerly Professor at the University of Bonn

Prof. Dr. Mustafa H. Khammash, for Control Theory and Systems Biology (1.8.2011), D-BSSE, formerly Full Professor at the University of California, Santa Barbara

Prof. Dr. Ellen Kuhl, for Mechanics (1.8.2011), D-MAVT, formerly Associate Professor at Stanford University

Prof. Dr. Jonathan M. Levine, for Plant Ecology (1.7.2011), D-UWIS, formerly Full Professor at the University of California, Santa Barbara

Prof. Dr. Rahul Pandharipande, for Mathematics (1.8.2011), D-MATH, formerly Full Professor at Princeton University

Prof. Dr. Martin Raubal, for Geoinformation Engineering (1.4.2011), D-BAUG, formerly Associate Professor at the University of California, Santa Barbara

Prof. Dr. Alexandre Refregier, for Physics (1.7.2011), D-PHYS, formerly E5 Engineer Researcher at the Astrophysics Service, CEA Saclay, France

Prof. Dr. Thomas J. Schmidt, for Electrochemistry and Head of the Electrochemistry Laboratory at the PSI (1.2.2011), D-CHAB, formerly R & D Director at BASF Fuel Cell GmbH, Frankfurt am Main, and Lecturer at the Provadis School of International Management & Technology, University of Applied Sciences, Frankfurt am Main

Prof. Dr. Bozidar Stojadninovic, for Structural Dynamics and Earthquake Engineering (1.7.2011), D-BAUG, formerly Full Professor at the University of California, Berkeley

Prof. Dr. Philip Ursprung, Professor for the History of Art and Architecture (1.2.2011), D-ARCH, formerly Full Professor for Modern and Contemporary Art at the University of Zurich

Prof. Dr. Gregory J. Velicer, for Evolutionary Biology (1.8.2011), D-UWIS, formerly Associate Professor at Indiana University, Bloomington, USA

Prof. Dr. Helma Wennemers, for Organic Chemistry (1.1.2011), D-CHAB, formerly Full Professor at the University of Basel

b) Promotions

Prof. Dr. Frédéric Allain, for Biomolecular NMR (1.6.2011), D-BIOL, formerly Associate Professor for the same subject area

Prof. Dr. Ralph Müller, for Biomechanics (1.1.2011), D-MAVT, formerly Associate Professor for the same subject area

Prof. Dr. Markus Reiher, for Theoretical Chemistry (1.6.2011), D-CHAB, formerly Associate Professor for the same subject area

Associate professors (new appointments)

Prof. Dr. Niklas Beisert, for Mathematical Physics (1.8.2011), D-PHYS, formerly Head of the research group on Duality & Integrable Structures at the Max Planck Institute for Gravitational Physics, Potsdam

Prof. Dr. Srđan Čapkun, for Computer Science (1.8.2011), D-INFK, formerly Assistant Professor (tenure track) at ETH Zurich

Prof. Dr. Jess Gerrit Snedeker, double chair at the University of Zurich/ETH for Orthopaedic Biomechanics (1.8.2011), D-MAVT, formerly Assistant Professor at the University of Zurich and ETH Zurich

Prof. Dr. Laurent Stalder, for the Theory of Architecture (1.8.2011), D-ARCH, formerly Assistant Professor (tenure track) at ETH Zurich

Assistant professors (new appointments)

Prof. Dr. Damien Calaque, for Mathematics (1.2.2011), D-MATH, formerly Maître de conférences at the University of Lyons

Prof. Dr. Christian Degen, for Experimental Solid State Physics (tenure track) (1.4.2011), D-PHYS, formerly Assistant Professor at the Massachusetts Institute of Technology, Cambridge

Prof. Dr. Philipp Grohs, for Applied Mathematics (1.10.2011), D-MATH, formerly post-doctoral student at the Seminar for Applied Mathematics at ETH Zurich

Prof. Dr. Rudiyanto Gunawan, for Chemical and Biological Systems Engineering (1.2.2011), D-CHAB, formerly Assistant Professor at National University of Singapore

Prof. Dr. Steven Lee Johnson, for Physics (tenure track) (1.8.2011), D-PHYS, formerly Scientist at the Paul Scherrer Institute, Villigen

Prof. Dr. Ansgar Kahmen, for Physiological Plant Ecology (ERC) (1.10.2011), D-AGRL, formerly Senior Scientist at the Institute of Agricultural Sciences at ETH Zurich

Prof. Dr. Lian Pin Koh, for Applied Ecology and Conservation (SNSF) (1.6.2011), D-UWIS, formerly Senior Assistant at ETH Zurich

Prof. Dr. Benoît Kornmann, for Cell Organelle Biology (SNSF) (1.6.2011), D-BIOL, formerly SNSF Advanced Researcher at the University of California, San Francisco

Prof. Dr. Maksym Kovalenko, for Inorganic Functional Materials (tenure track) (01.7.2011), D-CHAB, formerly post-doctoral student at the University of Chicago

Prof. Dr. Andreas Krause, for Computer Science (tenure track) (1.2.2011), D-INFK, formerly Assistant Professor of Computer Science at the California Institute of Technology, Pasadena

Prof. Dr. Mathieu Luisier, for Computer-based Modelling of Nanostructures (SNSF) (1.8.2011), D-ITET, formerly Assistant Research Professor at Purdue University

Prof. Dr. Wanda Mimra, for Risk and Insurance Economics (tenure track) (1.11.2011), D-MTEC, formerly post-doctoral student at the Department of Economics at the University of Cologne

Prof. Dr. Pierre Nolin, for Mathematics (1.8.2011), D-MATH, formerly Instructor at the Courant Institute of Mathematical Sciences at New York University

Prof. Dr. Periklis Pantazis, for Biosystems Analysis (tenure track) (1.11.2011), D-BSSE, formerly Postdoctoral Scholar at the California Institute of Technology, Pasadena

Prof. Dr. Paola Picotti, for the Biology of Protein Networks (SNSF) (1.6.2011), D-BIOL, formerly Group Head at the Institute of Biochemistry at ETH Zurich

Prof. Dr. Olga Sorkine, for Computer Science (tenure track) (1.2.2011), D-INFK, formerly Assistant Professor for Computer Science at the Courant Institute of Mathematical Sciences at New York University

Prof. Dr. Michael Strasser, for Sediment Dynamics (1.10.2011), D-ERDW, formerly MARUM Fellow and Postdoctoral Researcher at the DFG Research Center/Cluster of Excellence "The Ocean in the Earth System" at the University of Bremen

Prof. Dr. Savas Tay, for Bioengineering (tenure track) (1.2.2011), D-BSSE, formerly Postdoctoral Associate at Stanford University

Prof. Milica Topalović, for Architecture and Territorial Planning (tenure track) (1.8.2011), D-ARCH, formerly Head of Research at the ETH Studio Basel

Prof. Dr. Joost VandeVondele, for Nanoscale Simulations (ERC) (1.11.2011), D-MATL, formerly Senior Assistant at the Institute of Physical Chemistry at the University of Zurich

Prof. Dr. Lenny H. W. Winkel, for Inorganic Environmental Geochemistry (1.8.2011), D-UWIS, formerly Marie-Curie post-doctoral student in the Environmental Geochemistry group at the LGIT at the Joseph Fourier University, Grenoble

Prof. Dr. Vanessa C. Wood, for Nanophotonics and Nanoelectronics (tenure track) (1.1.2011), D-ITET, formerly post-doctoral researcher at the Massachusetts Institute of Technology, Cambridge

Adjunct professors

Prof. Dr. Kazimierz Conder, D-MATL, employed as Scientist and Senior Lecturer

Prof. Dr. Matthias Ernst, D-CHAB, employed as Senior Assistant and Senior Lecturer

Prof. Dr. Donat Fäh, D-ERDW, employed as Scientist and Lecturer

Prof. Dr. Philippe Henry Hünenberger, D-CHAB, employed as Scientist and Lecturer

Prof. Dr. Peter Andreas Kast, D-CHAB, employed as Scientist and Lecturer

Prof. Dr. Pietro Lura, D-BAUG, employed as Scientist and Lecturer

Prof. Dr. Hans Arno Synal, D-PHYS, employed as Scientist and Lecturer

Prof. Dr. Carlo Thilgen, D-CHAB, employed as Senior Assistant and Lecturer

Prof. Dr. Mario Wüthrich, D-MATH, employed as Scientist and Lecturer

For abbreviations of departments → Organisation page 70

Donations

Once again in 2011, numerous companies, foundations, organisations and private individuals have helped to strengthen and extend the educational and research work of ETH Zurich by making a donation. ETH Zurich is grateful to all its donors for their valuable contributions and for their confidence.

Companies

ABB Schweiz AG, AdNovum Informatik AG, Alpiq AG, ALSTOM (Schweiz) AG, Amman Group AG, Avaloq Evolution AG, AXA Research Fund, Axpo AG, Biotronik AG, BKW FMB Energie AG, Bühler AG, CKW Centralschweizerische Kraftwerke AG, Coop, Credit Suisse, Dow Europe GmbH, EGL AG, EKZ Elektrizitätswerke Kanton Zürich, EOS Holging S.A., Ernst Basler + Partner AG, ETEL S.A., ewz Elektrizitätswerk Stadt Zürich, Fabrimex Systems AG, Franke Artemis Group, Geberit Holding AG, Google Inc., Gruner AG , Heiner Thorborg & Co., Hilti AG, Holcim, Implenia AG, Kaba Holding AG, Knecht Holding AG, KPMG, Leister, Metall Zug AG/V-Zug AG, Philips AG, Plastic Omnium, PPCmetrics AG, Roche, Shell Exploration & Production, Siemens Schweiz AG (BT Division), Sika AG, Swiss Re, Swisscom AG, Syngenta, The Boston Consulting Group AG (Switzerland), United Technology Research Center, Zürcher Kantonalbank.

Organisations and foundations

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Encouraging new talent, speeding up innovation

By making a donation to the ETH Zurich Foundation, companies, foundations, organisations and private individuals are supporting ETH Zurich in implementing its strategic objectives and so making a valuable contribution to greater innovation. The ETH Zurich Foundation is an independent, non-profit-making foundation with the aim of bringing together the university and those who wish to make a donation to it, to promote education and research at ETH Zurich. Whether the donation is earmarked for a particular purpose or is for the benefit of a general area of interest at ETH Zurich – thanks to private commitment like this, the university is able to speed up the resolution of the urgent challenges facing society today.

Strategic initiatives at ETH Zurich
Research and training in areas of particular social and scientific relevance are being strengthened at ETH Zurich with strategic initiatives. Within these initiatives, the university establishes new chairs with outside support, encourages young talent and launches innovative research projects. ETH Zurich is currently focusing on the following strategic initiatives:

Excellence Scholarship & Opportunity Programme
Pioneer Fellowships
Sustainable Construction
Medical Engineering and Health
World Food System
Integrative Risk Management
Electrical Energy
Geothermal Energy
Quantum Sciences

→ www.ethz-foundation.ch

Organisation chart

Ombudsmen

Executive Board

President
Prof. Dr. Ralph Eichler

Rector
Prof. Dr. Heidi Wunderli-Allenspach

Vice President Research and Corporate Relations
Prof. Dr. Roland Siegwart

Vice President Finance and Controlling
Dr. Robert Perich

Vice President Human Resources and Infrastructure
Prof. Dr. Roman Boutellier

University Assembly

16 Departments in five disciplines

Architecture and Civil Engineering

Architecture
D-ARCH

Civil, Environmental and Geomatic Engineering
D-BAUG

Engineering Sciences

Mechanical and Process Engineering
D-MAVT

Information Technology and Electrical Engineering
D-ITET

Computer Science
D-INFK

Materials Science
D-MATL

Biosystems Science and Engineering
D-BSSE

Natural Sciences and Mathematics

Mathematics
D-MATH

Physics
D-PHYS

Chemistry and Applied Biosciences
D-CHAB

Biology
D-BIOL

System-oriented Natural Sciences

Earth Sciences
D-ERDW

Environmental Sciences
D-UWIS*

Agricultural and Food Sciences
D-AGRL*

Management and Social Sciences

Management, Technology and Economics
D-MTEC

Humanities, Social and Political Sciences
D-GESS

As of 31.12.2011

* As of 1 January 2012, the departmental structure at ETH Zurich has changed: the new Department of Environmental Systems Science (D-USYS) now encompasses Agricultural Sciences and the former Department of Environmental Sciences. Food Sciences are now incorporated in the new Department of Health Sciences and Technology (D-HEST).

Competence centres for key areas of research

At ETH Zurich
Digital Design and Modeling (CC-DDM)
Electromagnetics (SEREC)
Energy Science (ESC)
Materials Research (MRC)
Micro and Nano Sciences (MNSP)
North-South Centre
Socio-Enonomic Crises (CCSS)
Teaching and Learning (EducETH)

In the ETH Domain
Energy and Mobility (CCEM-CH)
Environment and Sustainability (CCES)
Materials Science (CCMX)

With other institutions
Climate Systems Modeling (C2SM)
Finance (CCFZ)
History of Knowledge (CC-HK)
Metabolic Diseases (CC-SPMD)
Neurosciences (ZNZ)
Plant Sciences (PSC)

ETH Zurich Executive Board

Ralph Eichler (1947) was elected Associate Professor in 1989 and, since 1993, has been Full Professor for Experimental Physics at ETH Zurich. From 1995 to 1997 he headed an international partnership of about 400 researchers at the German Electron Synchrotron (DESY), and from 2002 he was Director of the Paul Scherrer Institute (PSI). Ralph Eichler has been President of ETH Zurich since September 2007.

Heidi Wunderli-Allenspach (1947) was appointed Assistant Professor for Biopharmacy at ETH Zurich in 1986. From 1992 she was an Associate Professor and, since 1995, has been Full Professor in the same specialist field. During this time she had various university management responsibilities, including as Director of Studies and Head of Department. Heidi Wunderli-Allenspach has been Rector of ETH Zurich and deputy to the President since September 2007.

Roland Siegwart (1959) has been Full Professor for Autonomous Systems at ETH Zurich since July 2006 and Vice President Research and Corporate Relations since January 2010. From 1996 he was Professor for Autonomous Microsystems at the École Polytechnique Fédérale de Lausanne (EPFL); before that, he worked in industry for many years and was co-founder of a number of spin-off companies at ETH Zurich.

Robert Perich (1961), who has a doctorate in Business Administration, has been Head of the Finance and Controlling division at ETH Zurich since 2003 and, since October 2008, Vice President Finance and Controlling. Before that, he worked for eleven years in the financial services industry, most recently as CFO and member of the Executive Board of the Private Banking Switzerland division of a leading Swiss bank.

Roman Boutellier (1950) has been Professor for Technology and Innovation Management at ETH Zurich since 2004 and Vice President Human Resources and Infrastructure since October 2008. From 1993 to 1999 he was Professor for Innovation and Logistics at the University of St. Gallen. Before he was appointed to ETH, he held various management positions in Swiss industry.

Intelligent energy systems for the future

Ensuring that our energy future is sustainable is a big challenge. Everyone involved agrees that solving the energy problem will take more research, development and training – and ETH Zurich has been forward-looking in working for years to meet this requirement as effectively as possible.

Thanks to its broad and interdisciplinary approach and its tremendous technical expertise, ETH Zurich is working on promising, soundly-based overall solutions for our energy future, providing the technical expertise for projects where knowledge is put into practice. Whether it be renewable energies, ways of producing electrical energy, nanoparticles for better energy efficiency or intelligent buildings: in both its education and its research, ETH Zurich is committed to finding sustainable solutions for complex problems.

Nanomaterials lead to more energy efficiency

In the Laboratory for Nanoelectronics, Professor Vanessa Wood and her research group study charge transport in nanomaterials, which have diameters 80,000 smaller than a human hair, to be used in energy-related systems such as batteries, solar cells and LEDs. For example, some semiconductor materials, when made into nano-sized crystals, show extraordinary optical properties that can be used to make more energy efficient lighting that mimics sunlight.

→ www.lne.ee.ethz.ch

New ways of producing electrical energy

In Central Europe, we would like to be able to use more energy from renewable sources; for example, wind energy from the North Sea and the Baltic, or solar power from Southern Europe or North Africa. That will require new, higher-capacity transmission networks that would have to be both environmentally friendly and accepted by the population. At the Power Systems and High Voltage Laboratories (EEH), Professor Christian Franck is researching future methods of energy transmission. He also teaches his students the basic principles of this research, by means of impressive experiments in the high-voltage laboratory.

→ www.eeh.ee.ethz.ch

Intelligent building shell optimises energy consumption

Sustainable building takes account of the ecological, economic and social aspects of a building. Under the guidance of Professor Arno Schlüter, Dino Rossi is developing a modular, adaptive facade which adjusts automatically to energy, light and temperature requirements and also allows scope for architectural design features. The individual elements organise themselves and orient themselves automatically. Depending on the objectives that have been set, the facade can produce energy, create shade or adjust the light conditions inside. It all requires a complex network of sensors and information technology.

→ www.suat.arch.ethz.ch

On the move with solar power

To build an environmentally friendly and stylish road car that runs on solar power: that's the aim of the SunCar focus project. Under the guidance of Professors Konrad Wegener and David Dyntar, mechanical engineering students have developed a vehicle with two electric motors, supplied with solar power by stationary photovoltaic cells and a small biofuels motor. The environmentally friendly SunCar should be able to go from 0 to 100 km/h in five seconds, travel long distances without tanking up and significantly reduce CO_2 emissions – an important step towards the age of electric mobility.

→ www.sun-car.ch

Fuels from renewable energy

A research team led by Aldo Steinfeld, Professor at ETH Zurich and Head of the Solar Technology Laboratory at the Paul Scherrer Institute, has demonstrated the stable, efficient and rapid generation of solar fuels. The scientists have developed a high-temperature solar reactor in which concentrated solar radiation drives the thermochemical conversion of water (H_2O) and carbon dioxide (CO_2) into hydrogen (H_2) and carbon monoxide (CO). This gas mixture is known as "Syngas" and serves as the precursor of kerosene, gasoline, and other synthetic liquid fuels.

→ www.pre.ethz.ch

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