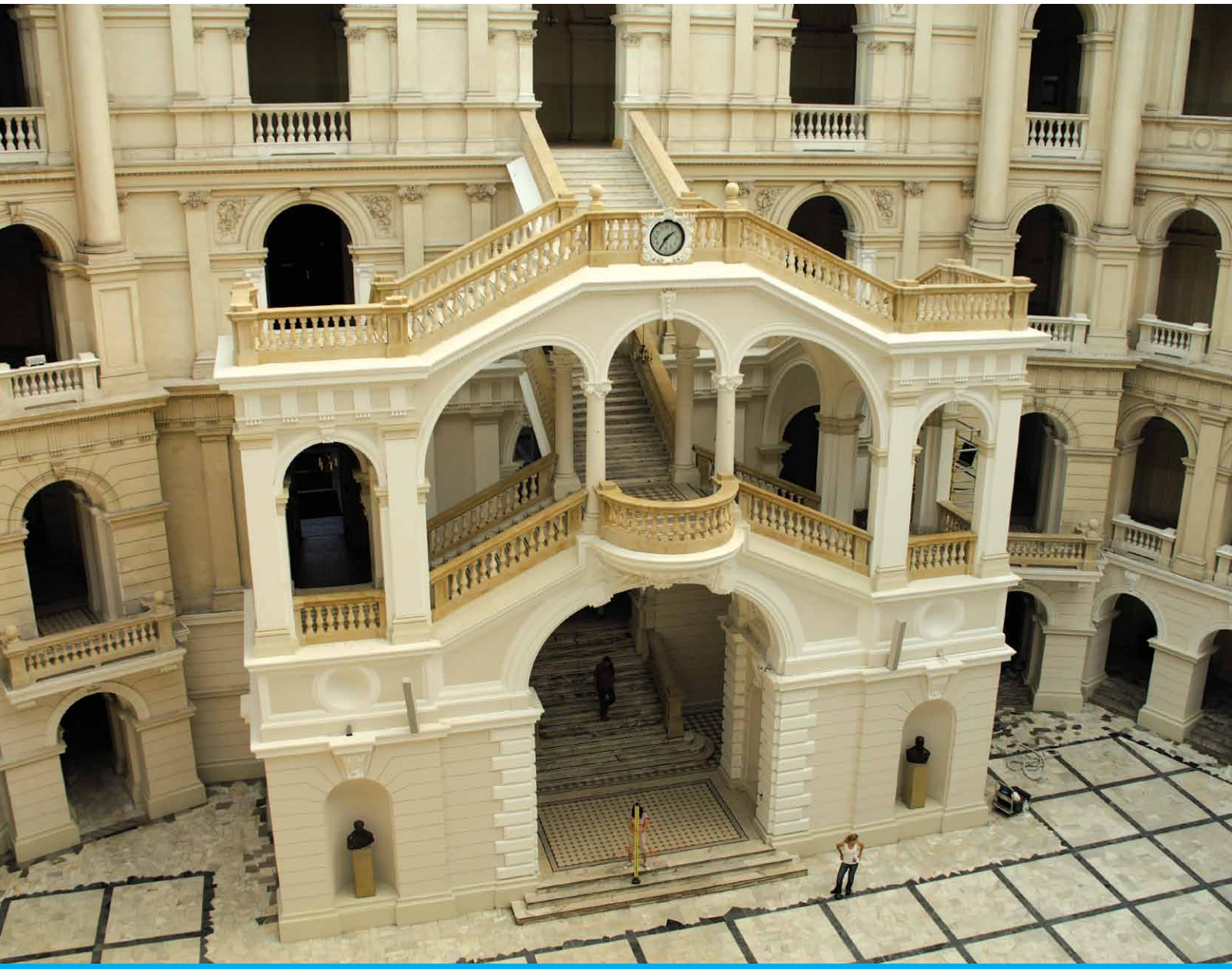
No. 1 NEWSLETTER

Center for Advanced Studies
OF WARSAW UNIVERSITY OF TECHNOLOGY



INSIDE THIS ISSUE:

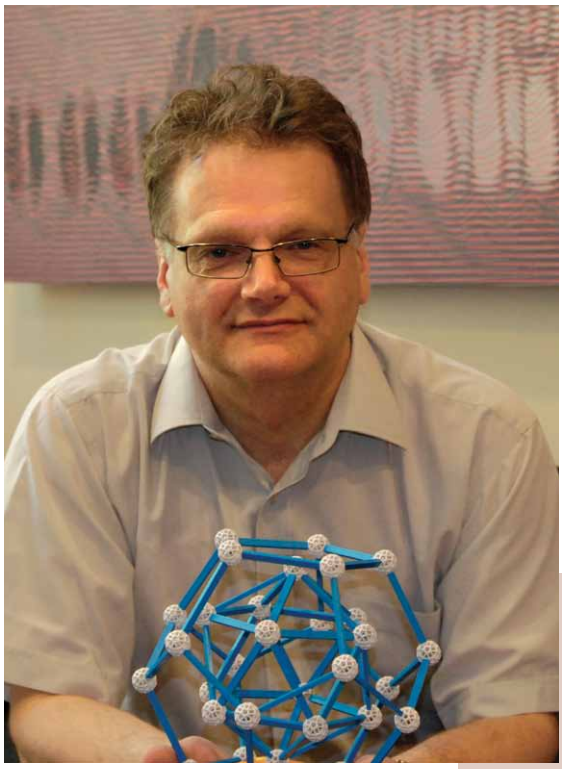
The newsletter no. 1 covers the first four issues of the CAS bulletin *Profundere Scientiam* (published from June 2009 to April 2011).
All the issues of *Profundere Scientiam* (in Polish) are available on http://www.csz.pw.edu.pl/index.php/pl/biuletyny

Our mission –

who we are and what we do

Professor Stanisław Janeczko, CAS Director

Center for Advanced Studies (CAS), established in February 2008, as a prestigious interfaculty unit at Warsaw University of Technology, is a forum for multidisciplinary seminars and advanced courses promoting new approaches to the frontiers of knowledge. Its primary aim is to raise the quality of MSc and PhD students' education, to facilitate their research achievements and to arouse their passion for further scientific development. Thanks to the international fellowship programmes, executed within the European Social Fund, CAS co-operates with distinguished international scientific research centers and hosts the finest academics representing a broad spectrum of both science and humanities. We develop cutting edge ideas by implementing a diversified, interdisciplinary advanced studies curriculum – a top-quality agenda of lectures, talks, seminars, workshops, involving meetings, symposia and others. Additionally, the Center grants scholarships through *the Development Programme of Warsaw University of Technology*, and funds PhD students and academics in undertaking, continuing and completing challenging research projects.



↑ Photo: CAS archives

I am delighted to announce and present the first issue of the **CAS Newsletter** summarizing the CAS key issues and the main information on the Center's core activities. I hope the readers will find it inspiring and will appreciate our zest for improving the world of science.

Professor Stanisław Janeczko is the founder and the Director of Center for Advanced Studies at Warsaw University of Technology, Head of the Department of Analysis and Singularity Theory at the Faculty of Mathematics and Information Science, Warsaw University of Technology, Director of Stefan Banach International Mathematical Center. Professor Janeczko was formally Head of the Institute of Mathematics of the Polish Academy of Sciences and Dean of the Faculty of Technical Physics and Applied Mathematics.

↑ Professor Kroto's visit to Żelazowa Wola (the Fryderyk Chopin Museum), July 2010 | Photo: CAS archives

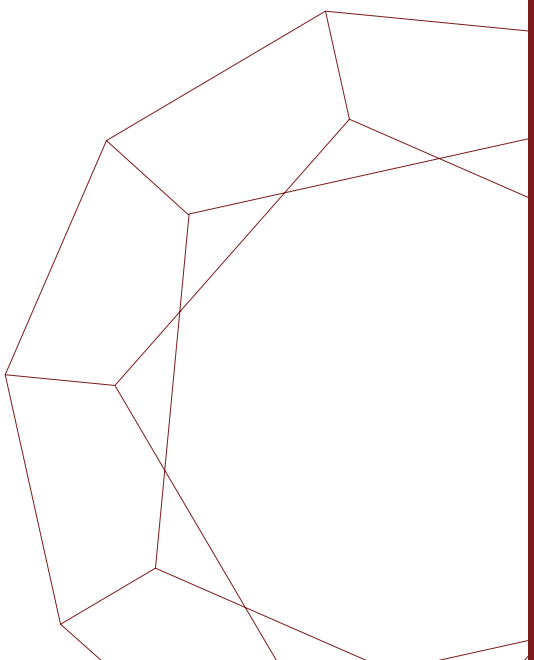
BREAKTHROUGH IN SCIENCE IS MADE WHEN NOBODY EXPECTS IT TO HAPPEN

Professor Harold W. Kroto

Professor Kroto defines the core of science in terms of looking for questions and answers, where scientists should be able to prove their theses. As he states: "If you cannot justify your claims than they are not worth the paper which they are written on". Professor Kroto emphasizes that to differentiate the truth from the otherwise we need to have fundamental philosophical constructs. Young children, who may in the future become scientists, should be brought up without any religious and political baggage, and most of all, they should be taught to raise questions. According to professor Kroto, contemporary science is in crisis because funding science has become an acute problem, generated by the popular view that science must be useful for all sectors of the economy and must have commercial applications that are valuable for society. Professor Kroto explains that despite the global demand for 'useful' science, it does not work this way and spectacular breakthroughs are sometimes made unexpectedly. Moreover, Kroto expresses anxiety about the future of human kind and enumerates challenges which humanity may face within a few decades. The key problem is the survival of the human species given that the vision of our future is rather unclear and pessimistic. Professor Kroto sees powerful forces becoming more and more destructive that, eventually, may threaten or annihilate the infrastructure of society. To reverse the inevitable, we have to focus on the 'sustainability issue' and look for solutions for how we can sustain the present level of lifestyle. We have to first face the searing global issues affecting many parts of the globe – hunger, poverty, access to water, electricity and other basic facilities. There has to be a sociopolitical world power to solve the above problems because the current situation cannot last forever, and concludes: "Above all, remember your humanity".

(The interview with professor Kroto was published in the CAS bulletin *Profundere Scientiam* Issue No. 3)

Professor Harold Kroto is a 1996 Nobel prize-winner (shared with Robert Curl and Richard Smalley, Rice University, Houston, USA) for discovering fullerenes. He is a lecturer at Florida State University, USA and conducts research in free radicals and molecules containing chains of carbon atoms with numerous multiple bonds.



HOW LONG WILL IT TAKE TO UNDERSTAND THE WORLD?

Professor Shing-Tung Yau

↑ Photo: CAS archives

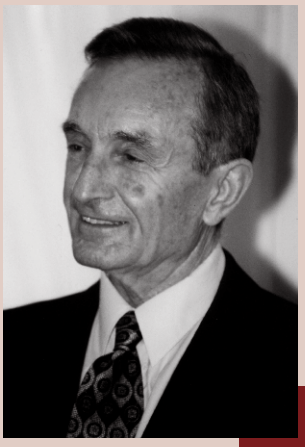
Many scientists think that once they have made a discovery, their work in the field has ended. Yet, there are scientists representing other domains of science who want to reexamine the issue and find other applications. Mathematicians do not usually deal with globally applied phenomena and there is always a possibility that their work will never have any practical implementation. Mathematics, professor Shing-Tung Yau believes, describes the world automatically, but the results may be used for further exploration in an area of research that is different to mathematics. When humanity faces a new challenge, we do not always know where this will lead or, what it is made for. As for the process of work itself, professor Shing-Tung Yau emphasizes that mathematicians can work either individually or within a group or as part of a scientifically diversified team where the knowledge of mathematics completes a given stage of research. In fact, what is so charming about mathematics is that mathematicians can work everywhere – in a room, during a stroll, and wherever one can write down formulas on a sheet of paper.

(The interview with professor Shing-Tung Yau was published in the CAS bulletin *Profundere Scientiam* Issue No. 1)

Professor Shing-Tung Yau is a world-renowned mathematician. He solved the Calabi conjuncture which is of fundamental importance for algebraic geometry and modern physics. He is a lecturer at Harvard University, USA and a winner of Fields medal (1982).

HISTORY – THE MEMORY WHICH BUILDS CIVILIZATIONS

Professor Henryk Samsonowicz



↑ Photo: CAS archives

Professor Samsonowicz perceives history as an important ingredient of our existence in the world. It is memory of our lives, memory which is a foundation for all human communities – family, national, religious, ideological and individual. People do not simply exist without memory. History teaches that changes in biology, climate and other spheres of human life are necessary processes. It makes us understand the changeability of the world and adapt better to new forms of life. Professor Samsonowicz claims that societies remember many events. When asked how to see them as a whole while simultaneously staying objective, he answers that multiplicity of opinions is in itself an enriching value. At the same time, however, we need to work out a firm compromise and guard if this variety does not harm others. Humbleness towards all fields of cognition is a key to examining phenomena. Professor Samsonowicz, an expert on the Middle Ages, believes that medieval history, appearing so distant when compared to our times, is for historians what childhood memories are for adults. Professor Samsonowicz continues to research the searching questions in medieval history and history in general.

(The interview with professor Samsonowicz was published in the CAS bulletin *Profundere Scientiam* Issue No. 4)

Professor Henryk Samsonowicz is an eminent historian-medievalist, a lecturer at the University of Warsaw and a member of the Polish Academy of Sciences. He is an author of 800 publications and was awarded with the Order of the White Eagle.

BROAD SPECTRUM OF NANOTECHNOLOGY

Professor Jerzy Ružyłło

Professor Ružyłło points out that nanotechnology is a broad term and, consequently, it is often excessively used for marketing and catchy purposes without any deep understanding of its meaning. Moreover, there are many misusages of this term because for many scientists, nanotechnology means something different. For professor Ružyłło, nanotechnology relates to semi-conductors in integrated systems. The development of this domain evolves and it is difficult to define its milestones. There are neither models nor simulations which can predict which technologies or technological discoveries will undergo a large-scale market absorption. And, as professor Ružyłło underlines, whether we like this or not, market demand is an ultimate measure of success for any technological solution. It is worth provoking a discussion concerning the impact which nanotechnology exerts on social relations. We should also examine to what extent one can control nanotechnology on atomic and molecular levels while manipulating living matter.

(The interview with professor Ružyłło was published in the CAS bulletin *Profundere Scientiam* Issue No. 3)

↓ Professor Jerzy Ružyłło, Colloquium Lecture: *Semiconductors of the 21st century*, February 2010 / Photo by: M. Giers (Foto Focus)

Professor Jerzy Ružyłło is an outstanding specialist in semiconductor theory, engineering, semiconductor material and device production, a lecturer at the Department of Electrical Engineering and Materials Science and Engineering, Penn State University, USA. He was a speaker within WUT Colloquium Lectures in February 2010.

SCIENCE SEEN AS PASSION AND PROFESSION

Professor Jonathan Blackledge

→ Professor Jonathan Blackledge is giving a concert for the *Great Music in the Small Hall* series, March 2010 / Photo: CAS archives

Professor Jonathan M. Blackledge is the Stokes Professor at Dublin Institute of Technology and a holder of a CAS scholarship for Visiting Professors (March 2010).

For professor Blackledge mathematics is an area he has and will always continue to research irrespective of whether or not he is paid to do so. It is more of a vocation than a profession and all that is required is peace and quiet. Professor Blackledge is not only a distinguished mathematician, but also a gifted musician which he proved by giving a concert at WUT for *the Great Music in the Small Hall* series. Professor Blackledge says that combining music and science has been a tradition in his family for many generations and that music and science are most definitely connected. First of all, we need to develop a technique and then use it to communicate ideas. According to professor Blackledge, musical notation is used to communicate artistic ideas, whereas mathematical notation is used to communicate scientific ones. Apart from scientific achievements, professor Blacklegde is an experienced businessman. As he explains: ”to succeed in business we must always assume that a new business venture may fail”. Professor Blackledge confesses that he has had more failures than successes in business for many different reasons and it is important to know when to cut your losses and move on.

(The interview with professor Blackledge was published in the CAS bulletin *Profundere Scientiam* Issue No. 3)

Nano, micro, mega

– new era in otosurgery

Professor Henryk Skarżyński

Professor Skarżynski is the first surgeon in Poland who succeeded in fitting cochlear implants in three deaf children (age 11 to 19 months). Nowadays such surgeries are successfully conducted owing to the skills of surgical teams and advancements in technology. As professor Skarżyński explains, modern implants process information more precisely, they are smaller, and they co-operate better with a living organism. At the Institute of Physiology and Pathology of Hearing, which is run by professor Skarżyński, the doctors treat extremely serious hearing impairments, diseases and malformations of the middle and inner ear. Professor Skarżyński says: "impossible became possible". The first implant fitting performed by Skarżyński in 1992 had a profound impact on contemporary diagnostics, treatment and rehabilitation. It also gave rise to establishment of the Institute of Physiology and Pathology of Hearing and, later on, establishing the International Center of Hearing and Speech.

(The interview with professor Skarżyński was published in the CAS bulletin *Profundere Scientiam* Issue No.2)

↑ Photo by M. Grzelak

Professor Henryk Skarżyński is Head of the Institute of Physiology and Pathology of Hearing, President of the Clinical Pathophysiology Committee of the Polish Academy of Sciences, a distinguished specialist in hearing impairment treatment and an author of a pioneer program of fitting cochlear implants in patients with total deafness.

Professor Marek Budzyński is a well-known architect and urbanist, Head of the Department of Urban Planning at the Faculty of Architecture WUT. He is famous for designing many public buildings (the University of Warsaw Library, the Warsaw Headquarters of the Supreme Court).

← Photo: CAS archives

SPACE ARRANGEMENT FOR LIFE CONTINUANCE

Professor Marek Budzyński

Professor Budzyński tries to reach an equilibrium among nature, human beings and space. In his opinion, designing consists in transforming space for human needs with the most crucial element in the process of planning being an ability to synthesize rational scientific elements with irrational ones: intuition, emotions and faith. Urbanists, while planning, must follow a prerequisite principle – to adjust projects to the world of nature. This idea is successfully accomplished in the architectural concept *a city within the city* which not only satisfies all needs and aspects of a local community, but also merges and co-exists with nature. *Cities within the city* form a balanced system and provide conditions for life continuance.

(The interview with professor Budzyński was published in the CAS bulletin *Profundere Scientiam* Issue No. 4)

CURIOSITY SHOULD BE AROUSED

Professor Mirosław Karpierz

↑ Photo: http://www.if.pw.edu.pl/~karpierz/7

When a butterfly flies next to us we often admire its beauty. Our attention is drawn to the subtlety of the wings and their intensive colours. Yet, only few people realize that, in fact, some butterflies are not colourful owing to the pigments they have in the wings. On the contrary, the wings are transparent, and the illusion of colours is produced by the wing structure, acting as a sort of a selective mirror; it reflects some wave lengths and lets in others (wavelength selective absorption). In optics such a microstructure is called a photonic crystal, professor Karpierz explains. He believes that easy solutions to scientific problems are within one's reach and it is worth observing nature to discern its objective regularities and transfer them into the world of science and technology. No development in science is possible without curiosity. Thus, we should look at flying butterflies and other natural phenomena around us.

(The interview with professor Karpierz was published in the CAS bulletin *Profundere Scientiam* Issue No. 2)

Professor Mirosław Karpierz is a lecturer at the Faculty of Physics, Warsaw University of Technology, a member of the CAS Advisory Council. He specializes in nonlinear optics of liquid crystals, nonlinear guided-wave phenomena, optoelectronic systems and devices.

CAS SCIENTIFIC WORKSHOPS

CAS Scientific Workshops, held twice a year in Spring and Autumn, give an opportunity for CAS scholarship holders to meet eminent academic staff, integrate beyond structures, domains and age. It is an arena for exchanging experiences, establishing research co-operation and broadening scientific horizons during inspiring discussions. Workshop participants present their scientific results either by giving an oral presentation or in posters. Those who have participated in CAS workshops confirm that it is an effective form of integration, promotion and inspiration; it is what makes science interdisciplinary.

THE COLLOQUIUM LECTURES

Lectures, seminars and expert seminars organized by Center for Advanced Studies is a forum for presentation, discussion and familiarization of contemporary achievements in science and technology. The speakers represent remarkably dynamic fields of research, and the ideas presented within the Colloquium Lecture foster the development of interdisciplinary scientific co-operation and innovation. Holding the Colloquium Lecture series is possible owing to the Center's close relations with other Polish and foreign research centers.

THE CAS ADVANCED STUDIES OFFER

The Advanced Studies Offer is a key element of the Center's activity. It is an annually scheduled agenda of interdisciplinary basic and special lectures (approximately 10 per semester), and masterclass lectures for MSc students and PhD seminars. The Offer is addressed to WUT students, either MSc or PhD studies, as well as to WUT academic staff.
The CAS Advanced Studies Offer aims at enriching and complementing the students' knowledge, acquired during their majors, and inspiring their future scientific careers.
Every Semester, the overall attendance of students is estimated at around a few hundred.

SCIENTIA SUPREMA

Scientia Suprema is a newly-launched CAS project within the Center's Advanced Studies Offer. The themes of Scientia Suprema lectures present outstanding scientific achievements and spectacular breakthroughs, for example and discoveries awarded with the Nobel prize. Scientia Suprema series has become an inherent part of the Center's mission of broadening horizons, inspiring and assimilating WUT academic circles.

CAS SCHOLARSHIPS

SCHOLARSHIPS FOR VISITING PROFESSORS

Center for Advanced Studies initiated the project 'scholarships for visiting professors'. The aim is to invite distinguished scientists representing world-renowned research institutions and to provide WUT students with an opportunity to attend lectures, seminars and meetings which are to significantly enrich their knowledge, broaden interests and inspire their future scientific studies.

A few words on the technical aspects of becoming a CAS visiting professor:

In practice, proposals of invitations may be submitted on any day up to the end of 2014. Invitations are possible on the initiatives of (optionally): the Rector of Warsaw University of Technology, at least two deans of two different WUT faculties, the CAS Judging Panel, professors themselves interested in being granted visiting professor scholarships (the motion will be examined after having been positively evaluated by two professors – heads of research teams representing two different faculties).
Necessary documents complementing the motion are: personal and contact data, a list of scientific achievements, a schedule of teaching and research activities within the scholarship, opinions of the interested WUT faculties and research teams. Scholarships are granted for a period of 1 to 6 months with a monthly installment of 17,000 Polish zlotys.

SCIENTIFIC SCHOLARSHIPS

CAS grants two kinds of scientific scholarships: foreign research scholarships for PhD students and academic staff and home research scholarships for PhD students and young PhDs. All scholarships are awarded to the most excelling, active WUT scientists who are highly motivated and devoted to developing their academic careers by conducting research being of key importance for the economy. CAS scholarships are the University's response to high social expectations in the field of education, technological innovation and a necessity for the continuous improvement of the WUT teaching potential.

So far Center for Advanced Studies has granted 245 scholarships – 149 for WUT PhD students and 96 for WUT full-time academic teachers. Every year the Center selects about 80 scholarship holders.

HUMAN CAPITAL NATIONAL COHESION STRATEGY
WARSAW UNIVERSITY OF TECHNOLOGY DEVELOPMENT PROGRAMME
EUROPEAN UNION EUROPEAN SOCIAL FUND
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CAS Newsletter
Warsaw University of Technology, Politechnika Square 1, 00-661 Warsaw, Poland
e-mail: csz@csz.pw.edu.pl, telephone no. (00 48 22) 234 60 02

Editor-in-chief/translation: Ewa Stefaniak
Editorial team: Joanna Jaszuńska, Patrycja Nieściur, Ilona Sadowska, Anna Żubrowska
Supervision: Professor Stanisław Janeczko
Proofreading: Professor Jonathan M. Blackledge
Graphic design/DTP: Diana Gawronkiewicz