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# NTU



## NEWSLETTER

October 2013 / No. 38

## President Yang: Sustainable Development

Biochemists Advance DNA Repair Research

Student Ambassadors to Paraguay

NTU Offers Chinese-Language Online Courses on Coursera

**Special Report**  
Wen-Yueh Lin Exhibition





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## NTU AT A GLANCE

Freshmen Learn Library Services Through Games



## From the President's Office

As an elite university NTU must place great importance on social responsibility. We are endowed with the finest students, most outstanding faculty and most plentiful resources and enjoy the broadest offering of academic fields, and it is therefore our driving mission to cultivate people of exceptional talent for the betterment of Taiwan. However, in addition to emphasizing academic performance, we aspire to produce students who take the initiative to help and make positive contributions to society.

In addition to the accumulation of knowledge in specialized fields, NTU will be giving greater emphasis to the development of core abilities so students can gain knowledge outside of their fields and give back to society following graduation. Around 30 to 40 percent of our graduates remain in the academic world while over half go on to pursue careers in a full range of professions. We will be designing a wider offering of creativity and entrepreneurship courses in order to give students more opportunities to develop teamwork and problem-solving skills.

In the area of internationalization, we have been converting many of our courses into on-line OpenCourseWare courses in hopes of sharing with the world the university's special strengths and academic accomplishments. On another front, we plan to provide scholarships for our summer programs to the children of overseas alumni in order to encourage them to come to Taiwan to study and learn about ethnic-Chinese culture.

Taiwan enjoys a rich and unique culture exemplified by Confucian thought and our political and economic history and traditional culture. Based on this niche, we aspire to promote NTU as a major base for education and research concerning East Asian and ethnic-Chinese society as well as a platform for the study of Chinese culture.

楊洋池

President  
Dr. Pan-Chyr Yang

# PRESIDENT YANG SPEAKS ON TAIWAN'S ADVANTAGES AND STUDENT SOCIAL RESPONSIBILITY

**N**TU President Pan-Chyr Yang presented a keynote speech at a forum on concepts of higher education and university internationalization here at NTU on August 14. President Yang touched on returning to Taiwan's unique local characteristics and advantages, cultivating talent for a global era, and making meaningful contributions to society. Some of the highlights of his speech are presented below.

## NTU's Unshirkable Responsibility

NTU is endowed with the finest students and faculty, and we are capable without a doubt of confronting the future challenges of globalization. Yet, what is the most important thing NTU should do? It is to cultivate what Taiwan needs—what we call members of civil society—to help Taiwan and the rest of the world develop sustainably and harmoniously. This is NTU's unshirkable responsibility.

## Globalization Requires Localization

In the process of globalization, is it enough for us to simply cultivate students who are completely globalized? The issues faced by each country are different. In particular, the problems we have created here require that our next generation be capable of devising solutions. How will our students be able to help solve the problems that have arisen in our own society and allow it to achieve a more harmonious development? Therefore, the cultivation of well-rounded professional talent demands the consideration of globalization as well as localization.

## Social Responsibility

Besides class rankings, there are also knowledge and ethics as well as social responsibility. All schools and all universities, in addition to maintaining scholastic freedom, should also instill in their students a sense of the importance of social responsibility, as a balance must be achieved between the two. NTU should emphasize striking a balance between the two as our unshirkable responsibility. In addition to academics, we need to educate students to realize their own social responsibility.



## Make NTU a Platform for Studying Ethnic-Chinese Culture

Just where are NTU's advantages? Taiwan is the place that has maintained ethnic-Chinese culture the most completely, while NTU is steeped in an atmosphere of academic freedom. Here, we conduct research into all aspects of ethnic-Chinese society, including Confucian thought, the course of history, politics and economics as well as the essence of this cultural tradition. This advantage of ours is exceptionally unique. Therefore, we should make NTU an introductory platform for studying ethnic-Chinese culture.

## Finding One's Own Advantage

How are we to reach the top of the world? NTU must follow NTU's path. Our strength is Taiwan enjoys a relatively free environment. This is something Hong Kong is not necessarily capable of achieving and Singapore is unable to achieve. If you are aware of this advantage, then you should be even more beholden to enhance it and use it to solve the problem.

## Cultivating Talent for Sustainable Development

In summary, NTU is endowed with the finest students and faculty and must follow its own path as it faces internationalization. We know where our advantage is. Most essential is that, as our students develop their knowledge and skills, we need to make them aware that one must give back to society if one takes from society and that social responsibility is paramount. They need sufficient core capabilities and the ability to compete with students around the globe. Give them stronger confidence, give them greater creativity and passion. Only then does Taiwan have the chance to continue moving forward and developing talent for sustainable development.



## NTU Opens Strategic Materials Center with Japan's NIMS



**N**TU President Pan-Chyr Yang and President Sukekatsu Ushioda of Japan's National Institute for Materials Science (NIMS) signed an agreement jointly establishing the Center of Strategic Materials Alliance for Research and Technology: SMART Center on July 26. The SMART Center will focus on the development of strategic materials required in energy, biomedicine, optoelectronics and nanotechnology. The center will serve as a platform for collaborative research projects, exchanges of visiting faculty and student researchers, the joint organization of international symposia and the promotion of industry-academic cooperation.

NIMS is one of the largest scientific research centers in Japan and employs more than 1,000 research and administrative personnel. With an annual budget of approximately NTD 7 billion, the institute is one of the world's leading research bodies specializing in materials research. While Taiwan's National Science Council has encouraged the establishment of joint research centers with influential international institutions in recent years, most of these centers have been opened in cooperation with institutions in Western developed countries.

NTU ranks among the world's top-50 institutions in the field of materials science. The SMART Center will enhance the quality of the university's research in this area, and it will facilitate the integration of human and research resources between the College of Engineering, College of Science, College of Electrical Engineering and Computer Science, College of Medicine and Center for Condensed Matter Sciences. Furthermore, the new center will grow into a cooperative research and development center that will draw international scholars and researchers.

## Retrospective Showcases Renowned Essayist and Translator



**R**enowned essayist and translator Wen-Yueh Lin is a professor emerita of the Department of Chinese Literature. To showcase her outstanding life and works on the occasion of the commencement of her eighth decade of life, NTU Library recently held "A Retrospective

Exhibition on Professor Emerita Wen-Yueh Lin at 80." Held September 3 - 27, the exhibition featured original translation manuscripts and paintings as well as notebooks from Lin's time as an NTU student. The Department of Chinese Literature also arranged an international academic symposium in connection with the exhibition.

Many distinguished guests attended the opening ceremony of the exhibition. The ceremony began with NTU Library Associate University Librarian Kuang-Hua Chen extending a warm welcome then turning the stage over to NTU President Pan-Chyr Yang, who officially opened the exhibition. Next spoke Dean of the College of Liberal Arts Jo-Shui Chen and the exhibition's curation consultant Prof. Ching-Min Ko of the Department of Chinese Literature. Finally, Lin appeared to talk about the inspiration behind her translation of the Japanese literary classic *The Tale of Genji*.

The retrospective displayed manuscripts and books of Lin's academic works, essays and translations. It presented some of her artworks, including sketches, her oil painting "A Scene of Tamsui" and three paintings of female figures. Also on exhibit were manuscripts left to Lin of the three scholars Lien Ya-tang, Tai Ching-nung and Cheng Chien. Moreover, the library screened the documentary "Afternoon in the Study: Wen-Yueh Lin" to give viewers deeper insight into this exceptional intellect.

# Archives Hold Artistic Exhibition of Documents and Bugs



Visitors received postcards and souvenirs that were designed especially for the exhibition.



The promotional poster for the exhibition entices visitors with an artistic butterfly.

Two members of the NTU Museums system combined efforts to put on a creative exhibition called “A Bug’s Wiki—The NTU Archives and Insectarium Exhibition” from August 28 to September 27. The joint exhibition featured an artistic coupling of human stories revealed through the university’s historical documents with the intricate beauty and kaleidoscopic colors of insects preserved in the university’s specimen collections. Going beyond the limits of traditional museum document exhibitions and displays of insects framed in glass, the exhibition presented viewers with a novel artistic approach for appreciating the university’s archived materials.

In line with the artistic theme of “A Bug’s Wiki,” the organizers designed an opening ceremony centered on a participatory art project that called on the creative talents of NTU President Pan-Chyr Yang and the other university officials who spoke during the ceremony. The project commenced with a large prepared canvas with paper cutouts in the shapes of butterflies attached to its surface. Given small bowls of ink in different pastel colors, President Yang and the other officials took turns pouring and splashing the ink to create overlapping explosions of color across the canvas. After the ink dried, the cutouts were removed to reveal the white negative images of the

butterflies hovering against a dazzling background of partially blended blue, orange, green and pink.

Planning for this special exhibition began early this year. Interestingly, the initial concept for the exhibition sprang from a single bug-damaged document dating from 1945 and grew into an artistic melding of historical documents and eye-catching insects. The organizers point out that although the Museum of Archives and Insectarium are both members of the NTU Museums system and enjoy positive everyday relations, they had never considered exploring opportunities for collaboration due to the considerable gap between their subject matters.

They never suspected that an unassuming old document that had suffered attack from bugs would hold so much potential for cooperation. Still, once the concept was born the organizers were confronted with myriad challenges concerning how to curate such an event. How would they blend the special characteristics of each archive without creating a



sense of divide? Following a series of discussions, the two archives called on the services of Insectarium artist and instructor Wen-Yue Zhuang and decided to curate the exhibition with a focus on visual elements rather than textual ones.

The inspiration for naming the exhibition “A Bug’s Wiki” came from the creation of a tie in between insects and documents. Just as we read the on-line encyclopedia Wikipedia to obtain information, we can peruse NTU’s historical documents to learn about the university’s history. The organizers also sought to instill a bit of fun into the exhibition by making its name in Mandarin (“*Chong Chong Wei Ji*”) homophonic to that of the 1998 animated movie “A Bug’s Life.”



## Osteoporosis Prevention Cuts Elderly Hip Fractures by 2.7% Annually



Since 2005, NTU Hospital has joined with the Health Promotion Administration and Taiwanese Osteoporosis Association to champion osteoporosis awareness and prevention, and signs of success are beginning to appear. National Health Insurance (NHI) statistics for the years 1999 to 2010 reveal the hospitalization rate for hip fractures among the elderly in Taiwan has declined steadily in recent years. A paper detailing a study conducted on this subject has been published in *Calcified Tissue International*.

Osteoporosis is the primary cause of broken bones for elderly people. In Taiwan, the ratio for hip fractures is 196 out of 100,000 for men and 392 out of 100,000 for women. Both figures are higher than the international standard.

Due to the rapid growth of Taiwan's senior citizen population, the number of elderly people hospitalized for hip fractures has increased from 14,342 in 1999 to 18,023 in 2010, a rise of about

25%. Yet, although this aggregate figure has climbed, we actually see a decline if we look rather at the rate of hospitalization. After adjusting the analysis with updated population figures from 2010, the hospitalization rate for hip fractures among people aged 65 and older dropped an average of 2.7% over the twelve years of the study, while the rate for those 75 and older fell an even more significant 6.1%. These statistics reflect the success of osteoporosis prevention efforts.

The study also discovered that total NHI expenditures for seniors hospitalized for hip fractures rose 30%. However, thanks to NHI coverage controls, recalibrated figures show hospitalization costs per person remained the same or declined slightly.

Taiwan has witnessed a decline in smoking, increase in calcium and vitamin D absorption, as well as a rise in obesity, all of which represent a decrease in risk factors for osteoporosis. It could be said

that the effort to raise awareness and promote prevention of osteoporosis since the founding of the Taiwanese Osteoporosis Association in 1997 has finally been shown to have made some headway by the downward trend in the hospitalization rate for hip fractures among senior citizens.

The health of elderly people today is better than that of people of the same age ten years ago, and they are less likely to suffer a fall. Nevertheless, over the course of the twelve-year study, expenditures on osteoporosis



medication expanded seven times while these drugs' share of the domestic consumer market for pharmaceuticals grew fivefold. This increase in the prescription of osteoporosis drugs might be playing a role in the decline in fractures among senior citizens.

The NHI currently covers drugs for people who have already suffered a fracture because they are most at risk. The study suggests prevention would be improved by expanding coverage to those who have yet to endure a fracture but are deemed to be at significant risk.

## Nine Professors Receive NSC Ta-You Wu Memorial Award

The National Science Council has announced the recipients of the 2013 Ta-You Wu Memorial Award, and NTU proudly congratulates the nine NTU professors who were named among this year's recipients. The NSC presents the annual award to scholars under the age of 42 to encourage academic and research excellence.

The award is named in honor of the atomic and nuclear theoretical physicist Ta-You Wu, who is known as the "Father of Chinese Physics." Wu served as president of Academia Sinica from 1983 to 1994.

### *The NTU faculty award recipients are:*

**Prof. Angela Yu-Chen Lin**, Graduate Institute of Environmental Engineering .....



**Prof. Hsuan-Tien Lin**, Department of Computer Science and Information Engineering .....



**Prof. Hung Hung**, Graduate Institute of Epidemiology and Preventive Medicine .....



**Prof. Yen-Yuan Chen**, Department of Social Medicine, School of Medicine, College of Medicine .....



**Prof. Tsung-Lin Yang**, Department of Otolaryngology, College of Medicine .....



**Prof. Yu-Chi Tung**, Institute of Health Policy and Management .....



**Prof. Jyh-Ming Liou**, Department of Surgery, College of Medicine .....



**Prof. Je-Ruei Liu**, Graduate Institute of Animal Science and Technology .....



**Prof. Ming-Lun Hsieh**, Department of Mathematics .....





# Student Ambassadors Visit Paraguay for Cultural Exchanges



Ⓐ Paraguayan Vice President Juan Afara joins the NTU student ambassadors in a group photo.



Ⓐ Paraguayan Vice President Juan Afara stands with Taiwan Ambassador to Paraguay Liu Der-li.

As part of the Ministry of Foreign Affairs' International Youth Ambassador Project, a delegation of seven NTU students headed by Prof. Luisa Shu-Ying Chang of the Department of Foreign Languages and Literatures (DFLL) visited Paraguay to engage in cultural exchanges for two weeks at the end of August. The delegation included students from the DFLL, Department of Political Science and Department of Finance. The NTU youth ambassadors maintained a busy itinerary during their Paraguayan adventure, meeting with locals as well as overseas Taiwanese, visiting universities in three cities, and enjoying the special opportunity to meet with Paraguay's new Vice President Juan Afara.

Paraguay is Taiwan's sole diplomatic ally in South America. The landlocked nation is also Taiwan's geographical antipodes, meaning it is the farthest place on Earth from Taiwan and noon in Taipei is midnight in Asunción. Though this is indeed interesting, it also meant NTU's student ambassadors were required to endure 43 hours of airports and airplanes to reach their destination.

However, once in Paraguay the students participated enthusiastically in cultural exchanges, visiting four universities, including the Universidad Nacional de Asunción, Universidad Nacional Del Este, Universidad Nacional de Itapúa and Our Lady of the Assumption Catholic University, as well as two high schools, the Colegio Experimental Paraguay-Brasil and Colegio Chiang Kai Shek del Paraguay.

To share Taiwanese culture with the Paraguayan students, the NTU ambassadors showed off their diabolo skills, provided demonstrations of Chinese cooking, put on a creative Hakka dance performance, and taught their Paraguayan peers to sing along with the pop song "You Are My Flower" by Taiwanese singer Wu Bai. Also, using a PowerPoint presentation, they provided a general introduction to Taiwan and NTU, and highlighted Taiwan's night markets, its temple culture and opportunities for studying Mandarin. At each of these schools, the student ambassadors were received by the school's president or principal and treated to delicious Paraguayan food and snacks.

The NTU delegation also met with the Paraguayan media. It visited the nation's three largest newspapers to give interviews and observe their printing operations. The students took part in two live television programs as well. On a morning program they discussed the purpose of their exchanges, Taiwan-Paraguay relations, the educational systems of the two countries and scholarships for studying in Taiwan, while on another show they gave a live performance of their diabolo skills.

The students also observed some of Taiwan's technology assistance programs in Paraguay, including a pig breeding center, flower cultivation center and fish aquaculture center.



The ambassadors had the fortune of arriving just four days after the inauguration of Paraguay's new president and vice president, which was attended by Taiwan's President Ma Ying-jeou. Taiwan Ambassador to Paraguay Liu Der-li even managed to arrange a meeting between the NTU students and Vice President Juan Afara.



## NEW PLUSSES ADDED AS 2013 SUMMER+ PROGRAMS EXPAND



Ⓐ A student tries his hand at Chinese calligraphy.

**A**fter four successful years of steady growth, NTU Summer+ Programs this summer introduced a major expansion by offering two existing programs twice each and adding three entirely new programs. In all, NTU offered seven summer programs for international students this year. Due to this expansion, the Summer+ Programs ended up drawing a record-high 235 students, 64% more than last summer.

This year, the Summer Intensive Program for Chinese Language and Culture and the Summer Program for Laboratory Research and Culture were each offered separately in both July and August. As universities around the world operate according to different academic calendars and summer vacation periods, the university decided to offer these popular programs twice in order to open up opportunities for more students to participate.

The addition of the three new programs has brought greater diversity to the university's selection of summer programs. The new programs are the College of Management's Plus 5 Global LEAD Summer Program, the College of Law's Plus 6 International Economic and Trade Law Summer Program, and the College of Social Sciences' Plus 7 NTU—UT Joint Summer Program

Ⓜ The NTU Summer+ students squeeze in for a giant group photo.



Ⓐ A student from Japan demonstrates a Japanese tea ceremony.

"Understanding Taiwan in Global Settings," with which the college teamed up with the University of Tokyo.

As in previous years, the university continued to offer the Plus 3 Biodiversity, Agriculture and Culture of Taiwan and Plus 4 Summer Program for Biotechnology.

NTU Summer+ Programs are designed to give students from around the world the chance to study the subjects they are interested in while learning firsthand about Taiwan. This summer the programs attracted students from such countries as the United States, Japan, Singapore, France, Belgium, Sweden, England and China. In order to promote interaction among the program's students and provide a stage for them to share their own cultures, the program's organizers put on Culture Night at the Shui-Yuan Dormitory Lounge. One student from Japan demonstrated a Japanese tea ceremony, while students from China performed on the pipa, guqin and suona. The students from Europe and North America were impressed by these displays of genuine Eastern art and culture.

The Summer Program for Laboratory Research and Culture solicited the participation of 50 laboratories at eight NTU colleges this year, giving the students in the program wide access to the university's abundant resources and advanced facilities as well as the professional research guidance of the laboratory professors.

In addition to lectures and fieldtrips to scenic locations around Taiwan, the programs also arranged activities highlighting Taiwan's ethnic-Chinese culture. These activities entailed local NTU students teaching the programs' students how to make xiang bao "fragrance sachets" and play mahjong as well as demonstrations by the Calligraphy Club and Martial Arts Club. This allowed the international and local students to get to know each other while experiencing fascinating aspects of traditional ethnic-Chinese culture.

## Students Use Summer Vacation to Study Abroad



Students from around the world took part in the IÉSEG School of Management summer program.

This summer vacation over 300 NTU students took part in three- to six-week study abroad programs organized by the Office of International Affairs at more than 20 NTU partner universities, including such elite institutions as the University of Oxford, Stanford University, Heidelberg University and Waseda University. The programs allowed the students to use their summer vacations to visit other countries to expand their international vision and reflect upon their own lives from the perspectives of other cultures.

What does the average NTU student plan for summer vacation? Traveling? A part-time job? Cram school? Or simply two months of personal time off? The OIA provides

alternative opportunities. The office has arranged summer study abroad programs for more than two decades now, and a large volume of students sign up each year.

This summer, the OIA offered students a selection of 28 programs in ten countries. The participating universities included such well-known institutions as the University of California, Berkeley, and Hertford College, Oxford, as well as the Autonomous University of Madrid, Free University of Berlin and Utrecht University. This diverse offering of programs, institutions and countries ensured students would enjoy an extraordinary summer experience.

While abroad, students have the chance to study side by side with

students from around the world and experience the open and free academic atmosphere of classes overseas. Students also learn to freely state their opinions in class and develop the courage to question the views of their professors. Such situations become starting points for NTU students to challenge themselves.



Students appear in a scene from a welcoming party at the Autonomous University of Madrid.

Yet, having faced such challenges, students return to the NTU campus knowing they have used their summer vacation to enrich themselves, and have learned to adapt to the pace of life in another country. Moreover, they come back with greater foreign language proficiency as well as stories and memories of new friends from around the world.

## Partnership Formed with Leading Mexican University

NTU and the National Autonomous University of Mexico (UNAM) signed a general agreement of collaboration in August. This premier Mexican academic institution is the first university in Mexico to establish partner university relations with NTU. The NTU-UNAM agreement lays the foundation for a range of bilateral exchanges and cooperation, for example faculty and research fellow



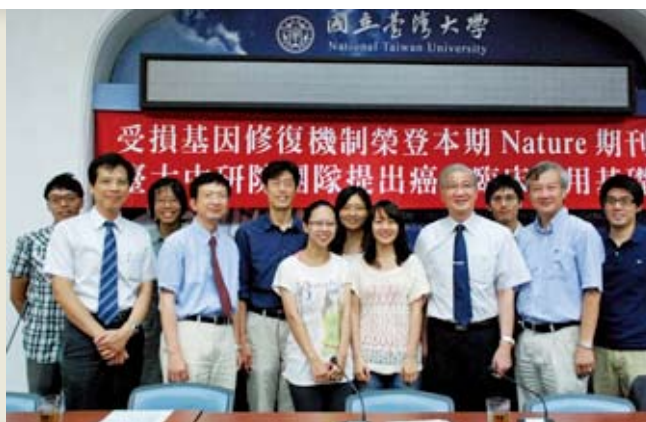
exchanges, student exchanges and academic information exchanges as well as joint symposia and conferences and joint research projects.

The formation of this new partnership was facilitated by the assistance of the Taipei Economic and Cultural Office in Mexico. The partnership marks the turning of a new page in NTU's academic exchanges with universities in Latin America, and will lead to further exchanges and cooperation between NTU and universities there.

In operation for over 450 years, UNAM in Mexico City is one of the oldest universities in the Americas.



# BIOCHEMIST'S INTERNATIONAL STUDY ON DNA REPAIR MECHANISM PUBLISHED IN *NATURE*



Cancer has long reigned as the leading cause of death in Taiwan and is an important focus of academic research here at NTU. Recently, Prof. Peter Hung-Yuan Chi of the Institute of Biochemical Sciences, as head of a team of international investigators who approached their research from the angle of biochemistry, discovered a genetic repair mechanism that the field of genetics is unable to explain and that holds potential for the development of pharmaceuticals and treatment of cancer. The significance of the team's finding is highlighted by its publication in the September 11 issue of the journal *Nature*.

NTU President Pan-Chyr Yang said in reaction to Prof. Chi's research, "NTU has long pursued cancer research and I look forward to continued innovative basic research that can be developed into applications for clinical treatments for the health of the nation's citizens."

The international institutions collaborating with NTU on this project were the Baylor College of Medicine, University of Iowa and Yale University, and the team's members included Baylor's Dr. Grzegorz Ira and Iowa's Dr. Anna Malkova. The team, using the yeast *Saccharomyces cerevisiae* as the material for their genetic research, found that the DNA helicase Pif1 plays an important role in the stimulation of homologous recombination (HR) for DNA repair.

Prof. Chi notes that the genome of a cell sustains various forms of damage daily and that DNA double strand breaks are the most serious form of damage. Still, cells possess a reaction mechanism for the repair

of these double strand breaks that allows the genome to maintain its integrity and avoid the emergence of diseases such as cancer.

He adds that if a cell is unable to repair DNA breaks immediately and appropriately the genome might become abnormal and unstable, and that irregular variation in the genome will result in severe consequences for the organism. For instance, abnormal embryonic development and cancers are created this way. Therefore, cells possess a strict genetic repair mechanism that ensures the integrity of the genome and the continued life of the organism.

Prof. Chi, whose background is in biochemistry, stresses that although the scientific community has made advances in understanding the homologous recombination reaction, it has as yet failed to explain how the cell stimulates DNA replication in order to complete the molecular mechanism of genetic repair.

In order to investigate the role helicase Pif1 plays in the process of homologous recombination, Prof. Chi's team joined forces with Yale's Dr. Patrick Sung and adopted a biochemical strategy to conduct their research.

Prof. Chi explains this is the first time the scientific community has used an approach combining genetics and biochemistry to explain the operational mechanism of helicase Pif1 that is behind the repair of damaged DNA in homologous recombination.

# Epigenetics Behind Leaf Development and Photosynthesis Revealed

**E**pigenetics refers to the study of heritable changes in gene expression and genetic traits that result from no changes to the DNA sequence. The molecular mechanisms behind epigenetics



Prof. Keqiang Wu poses with his research team in their laboratory.

include DNA methylation, histone modification and chromatin remodeling.

Prof. Keqiang Wu's laboratory at the Institute of Plant Biology uses primarily the model organism *Arabidopsis thaliana* to perform research that explores the molecular mechanisms of plant histone deacetylases (HDACs) in the regulation of plant growth and development. HDACs are able to hydrolyze  $\epsilon$ -N-acetyl ( $O=C-CH_3$ ) on the histone lysine of chromatin, making the structure of chromatin tighter and suppressing DNA expression.

Medical research has found a major correlation between HDACs and cancer. Therefore, in their investigations of HDAC inhibitors, scholars hope to identify ways to suppress cancer. Recently, research at Prof. Wu's lab has demonstrated that plant HDA6 influences leaf development, while HDA15 affects chlorophyll biosynthesis and photosynthesis. These results have been published in the respected international journals *PLoS Genetics* and *The Plant Cell*, where they have achieved impact factors of 8.517 and 9.251 respectively.

The forms and appearances of the leaves of different plants are not all the same. Previous research has shown that asymmetric leaves1 (as1) and asymmetric leaves2 (as2) proteins



Prof. Keqiang Wu

take advantage of the regulation of the KNOX gene family to influence leaf development. Still, the related molecular mechanisms of this phenomenon remain

unclear. Prof. Wu has pursued research into how plant HDACs regulate plant growth and development for many years. Most recently, he has found that the edges of HDA6 mutated leaves produce curled or serrated shapes and that KNOX gene expression shows a marked increase.

Further analysis using bimolecular fluorescence complementation and co-immunoprecipitation revealed that as1 and as2 proteins can join in a mutual effect with HDA6 to form a protein complex that regulates the expression of the KNOX gene family and causes changes in the differentiation of plant leaves. These results show that the development of plant leaves is influenced by epigenetic regulation that produces all varieties of different shaped leaf phenotypes.

In the other study, Prof. Wu found that HDA15 can bind to the phytochrome-interacting factor PIF3 to regulate downstream gene expression. During darkness, PIF3 will bind to the gene promoter that it regulates and also bind with HDA15, and thereby exploit the acetylation effect of HDA15 to remove the acetyl on the gene's chromatin and repress the gene's expression. Exposed to light, phytochrome will enter the cell's nucleus where it binds with PIF3, which causes the rapid break down of PIF3 by the proteasome. At the same time, HDA15 will leave the gene, which activates the expression of the gene, including chlorophyll biosynthesis and photosynthesis.

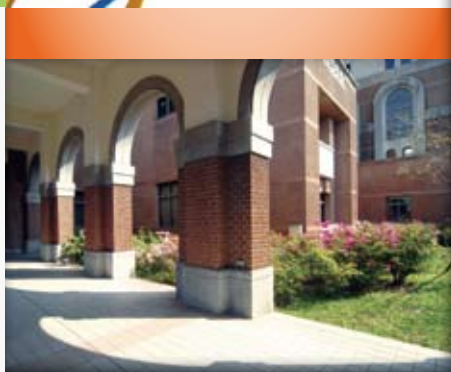
Prof. Chi's enlightening studies explain the epigenetic molecular mechanisms behind plant leaf development, chlorophyll biosynthesis and photosynthesis, and hold potential for development into valuable applications.



## Paper in *Nature* Deepens Understanding of Molecular Mechanism Behind Autism



**A**utism spectrum disorder (ASD) is a serious neurodevelopmental disorder that affects up to one in 50 children. Understanding the molecular mechanisms that cause ASD might lead to the development of new drugs for the treatment of this neurodevelopmental disorder.



Prof. Hsien-Sung Huang of the College of Medicine's Graduate Institute of Brain and Mind Sciences is a long-time member of a research team based at the University of North Carolina at Chapel Hill that recently published an important paper on the molecular mechanisms behind autism in the September 5 issue of the journal *Nature*. The paper presents research showing that topoisomerases promote the transcription of long genes related to ASD. This finding suggests that chemicals and genetic mutations that damage topoisomerases could contribute to ASD and other neurodevelopmental disorders.

Prof. Huang has made numerous high-impact contributions to the research of this team. Indeed, it was a study he published in *Nature* in 2012 demonstrating that topoisomerase inhibitors can activate dormant imprinted genes that initially sparked the Chapel Hill team's interest in investigating the role of topoisomerases in nerve cells.

In its recent research, the team showed that topotecan, a topoisomerase 1 inhibitor, reduces the expression of extremely long genes in neurons. By mapping RNA polymerase II density genome-wide in neurons, the investigators discovered that this length-dependent effect on gene expression was the result of impaired transcription elongation.

Prof. Huang notes that the expression of long genes is reduced in neurons with impaired topoisomerases, suggesting that topoisomerases play an important role in facilitating the transcription of long genes. Importantly, many high-confidence ASD candidate genes are exceptionally long and are significantly reduced in expression after topoisomerase inhibition.

The team's findings deepen our understanding of the molecular mechanisms that cause ASD and present a new target for the development of treatments for ASD.

## New Taiwanese Wasp Species Hitchhikes to Damselfly Eggs

**A** team of NTU entomologists has identified a tiny new species of semi-aquatic wasp that has drawn international media attention due to its discovery in Taiwan as well as its curious parasitic strategy of hitchhiking on the abdomens of damselflies before laying its own eggs in the damselflies'.

A mere 1.1-1.2 millimeters in length, the adult female of the *Hydrophylita* (*Lutzimicron*) *emporos* Shih & Polaszek (Hymenoptera: Trichogrammatidae) clings to the base of the female damselfly's abdomen near the base of the wings. When the damselfly lays its eggs, the wasp crawls to the tip of the abdomen and enters the water in order to locate and parasitize the eggs of its helpful and generous guide.

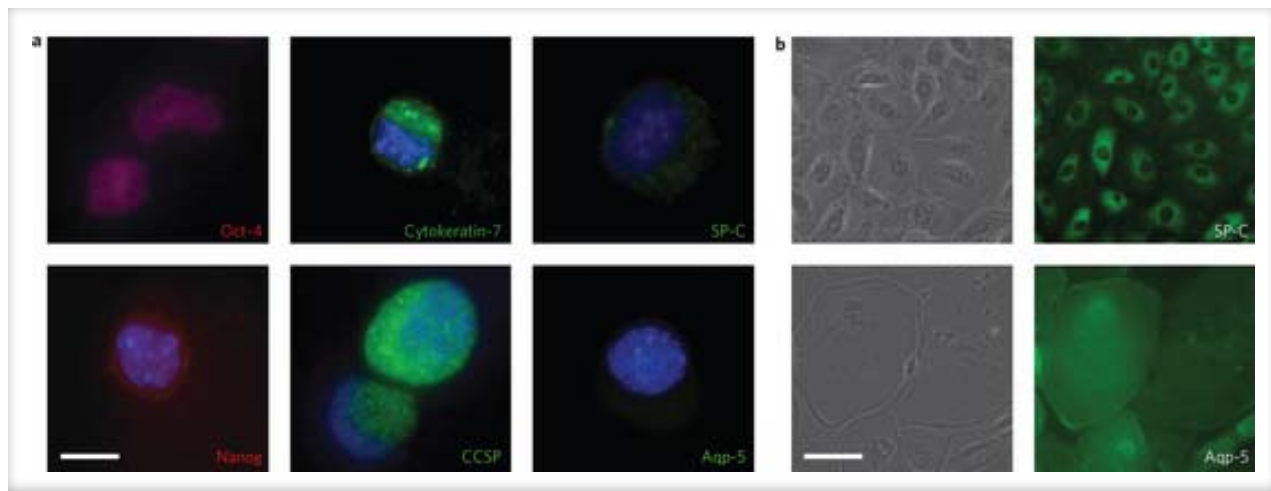
The wasp is the only one of its now-five-member subgenus to be found outside of South America and the only one to display phoresy, the behavior of hitching a ride on another organism.

After the team published its discoveries in the journal *PLoS ONE* in July, the story was picked up by major global media outlets, including *NewScientist* and *National Geographic*.





## Fluorescent Nanodiamonds Track Distribution of Transplanted Stem Cells



Stem cells possess the functions of maintaining the physiological equilibrium of tissues and repairing cellular damage within tissues. Therefore determining how to control precisely the distribution movements of stem cells following their transplantation into an organism has become crucial to the success of stem cell therapies.

Recently, Department of Chemistry PhD students Yan-Kai Tzeng and Yung Kuo joined a research team led by Distinguished Research Fellow Huan-Cheng Chang of the Academia Sinica Institute of Atomic and Molecular Sciences that developed an innovative cell tracking method that relies on fluorescent nanodiamonds, and could help answer this question. By integrating a number of novel technologies, their method permits the detection of the distribution of transplanted stem cells in lung tissue and provides high-resolution single-cell imaging. It can be used to observe and evaluate *in vivo* the ability of stem cells to repair damaged tissue following a transplant as well as to explore the factors and mechanisms that influence stem cell transplants. The team published a paper introducing its method in the highly-influential international journal *Nature Nanotechnology* in August.

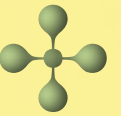
To begin the project, the stem cell research group led by Distinguished Research Fellow John Yu of the Academia Sinica Institute of Cellular and Organismic Biology used a glycoproteomics strategy to first conduct a systematic analysis of the glycoproteins expressed by different types of lung cells in order

to find the specific cell surface glycoproteins that are exclusive to lung stem cells. After highly-pure lung stem cells were isolated from the lung tissue of newborn mice, Dr. Chang's researchers used fluorescent nanodiamonds they developed to perform the fluorescence imaging labeling of the stem cells.

The investigators transplanted the fluorescent nanodiamond-labeled lung stem cells into mice via intravenous injection. They discovered that signals of the labeled lung stem cells were detectable in lung tissue only. In addition, using a fluorescence life cycle imaging system it developed for a confocal microscope to which it made its own improvements, the team was able to differentiate fluorescent lung stem cells from the natural fluorescence of the tissue and verify that the transplanted lung stem cells were distributed within lung tissue.

The fluorescent nanodiamonds used in this research not only provide a brighter, more persistent and more biocompatible labeling signal, the signal also makes it easier to track cell distribution in tissue. After transplanting nanodiamond-labeled lung stem cells into mice with damaged lungs, the researchers found both that the labeled stem cells returned to damaged parts of the lungs to repair lung tissue and regenerate new lung tissue, and that they could also utilize their confocal microscope fluorescence life cycle imaging system to track the distribution of the trace amounts of the lung stem cells. The team hopes to develop clinical applications based on its technology to treat disease and cancer.





# Student Club Demonstrates Love of Campus Dogs and Cats

It's daybreak on Royal Palm Boulevard and the students that will soon be on their way to class have yet to appear. A white mixed-breed dog lazes on the lawn adjacent to the Agricultural Exhibition Hall as it awaits the campus volunteer that comes to feed it each morning. Yet, this particular morning, the volunteer is followed by a group of people who are lurking behind an azalea bush.



between these animals and people, members of the club manage a relocation without needing to call on the dog catcher. The club also performs vaccinations regularly in order to ensure our dogs and cats remain free of disease. The club's website allows students to report incidents between people and animals and notify the club of animals that are injured. Members of the club always handle a reported situation within one day.

One of these figures raises a meter-long, five-centimeter-in-diameter metal blowgun and aims it at the unsuspecting dog as it chews its breakfast. One swift exhalation and the dart pins the target squarely in its right hind leg. The dog is startled and it darts off, but its movements remain normal and it appears unharmed. The people emerge from behind the bush to recover the blow dart from the now sedated dog, satisfied smiles on their faces.



Since 2008 the club has expanded its work beyond the NTU campus. Working in neighborhoods surrounding the campus as well as remote areas around Danshui, Keelung and Taoyuan, the club has cooperated with veterinarians to provide free spay and neuter services in order to help solve the stray animal problems of local communities. In July, the club visited communities around Ruifang and succeeded in sterilizing 104 dogs and cats in one day. From 2007 to this year, the Love Life Club has sterilized a total of 1,283 dogs and 1,148 cats.

This is not a case of animal abuse or some warped urban legend, it is the work of the NTU Love Life Club. The club has enlisted the services of a veterinarian to carry out this special operation to administer a vaccination to a campus dog that is difficult to approach.

Though rabies has reemerged in Taiwan, NTU, which is home to almost 30 dogs and cats, is free of fear. This is due to an arrangement between the Office of General Affairs and the Love Life Club in 2007 that placed the club in charge of managing the campus' canine and feline friends. Whenever friction arises



Last semester club members visited busy city areas on a number of occasions to set up booths in order to seek homes for orphaned dogs and cats. In preparing for this campaign, the club first conducted street surveys in Taipei City. The club's work not only allows its members to demonstrate their love of animals, but helps them develop confidence and communication skills as well.

## UNIVERSITY PUBLISHERS HOLD CHINESE LITERATURE READING FESTIVAL



Four intellectual luminaries take to the stage to read from *Family Catastrophe*.

Renowned Taiwanese writer and former NTU professor Wang Wen-hsing speaks to the audience following the book reading.

NTU Press teamed up with the university publishers of Taipei National University of the Arts, National Chengchi University, National Chiao Tung University and National Sun Yat-sen University to organize the 1st Chinese Literature Reading Festival, which took place September 5 - 9. Designed to showcase for the public the rich variety of publications offered by the nation's university publishers, the festival featured displays of

books and other unique works printed by the participating publishers.

The theme of the festival was the promotion of the love of reading through oral reading. Therefore, the publishers arranged two special events that allowed readers to experience the place and power of the voice in literature. The festival opened with the first of these events, a book reading at which recipients of the NTU Literary Award

from the last two years read aloud selections from their works and those of the other recipients.

The other event served as a pre-announcement of NTU Press' planned release of a collection of books on the writer and former NTU professor Wang Wen-hsing at the end of this year. For the event, Wang joined the luminaries Wang Chi-mei, John Sheng Kuo and Yang Chia-Hsien in lending their voices to reading excerpts from his first novel *Family Catastrophe*. Published in 1972, following seven years of repeated revisions, this novel features experiments with obscure words, simple words and created words, bits of English and the Mandarin phonetic system Zhuyin Fuhao, as well as special punctuation, including boldface text, underlining and squares.

## READING PROGRAM PROMOTES CHINESE LITERATURE ON AND OFF CAMPUS

The NTU Classics Reading Program has achieved six years of success since its introduction by the Department of Chinese Literature in 2007. The program's reading list of great works of Chinese literature expanded from nine classics the first year to 19 in 2008, and reached a total of 33 works this year.

The program presents the recommended books in the four categories of culture, poetry, classical fiction and modern fiction. The great works selected include the *Analects of Confucius*, *Mencius*, *Poetry of the Tang Dynasty*, *Poems of the Song Dynasty*, *Dream of the Red Chamber*, *The Travels of Lao Tzan*, *Love in a Fallen City* and *The Sandwich Man*.



This year the program added *The Condor Trilogy*, including *The Legend of the Condor Heroes*, *The Return of the Condor Heroes* and *The Heaven Sword and Dragon Saber*.

In promoting the program, teaching assistants prepare blog

entries to reach out to students. A website also provides summaries of the recommended books. On the website students can test their knowledge of Chinese literature through multiple choice questions and essay questions. Moreover, as of 2012 all freshmen have been required to write a composition about their reading experience or a book report concerning some classics on the list.

In the coming year, the program will work to broaden its readership to include the general public. Members of the public will have access to the test exercises on the program's website. Also, a survey will be conducted to gauge the promotion of the project among the public.



## Student Chip Designers Win at 13th Golden Silicon Awards

Macronix International Co. and Macronix Education Foundation established the Golden Silicon Awards in 2000. The semiconductor design and application competition encourages university students in Taiwan to engage in creative research and gain practical experience in the field of semiconductors and promotes positive exchanges between industry and academia. Three NTU student teams won awards at this year's 13th Golden Silicon Awards.

The team Diabetes Killers won an award for its hydrogel-based implantable wireless CMOS (complementary metal-oxide-semiconductor) glucose sensor SoC (System on a Chip). The team integrated microelectronics, micromechanics, biotechnology and biomedical chip technology to develop a gel-based sensor that can be implanted under the skin. The system lets patients avoid puncturing the skin to take blood samples or taking drugs, by allowing them to measure their blood glucose without pain or the risk of infection. Though this SoC blood glucose sensor technology is currently designed to help diabetics, in the future it can be applied as an integrated drug delivery system to be used in emergency medical treatment and treatment in remote locations.

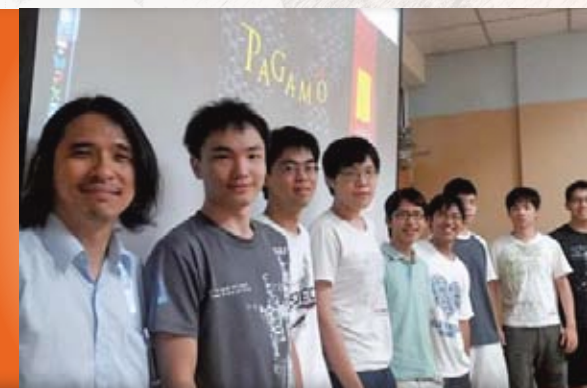
The Optimal Stimulator team developed an implantable CMOS sensor and adjustable-parameter electrical stimulator SoC. The system uses electrical nerve stimulation to treat the severe facial pain of trigeminal neuralgia sufferers safely and effectively without the need for medication or surgery. The implantable chip can also stimulate the vagus nerve to suppress epileptic seizures.

The students of Rising Dragon earned a Golden Silicon Award for the innovative wheeled mobile robot they designed for security, disaster assessment, ecological monitoring and tracking applications. The robot moves on shape-adjusting claw wheels that enable it to adapt its movement to rugged terrain and even to ascend high stairs. It also possesses environmental awareness due to its numerous sensor modules. It can collect video images and information and be operated remotely over the Internet on a tablet device, smartphone or computer.



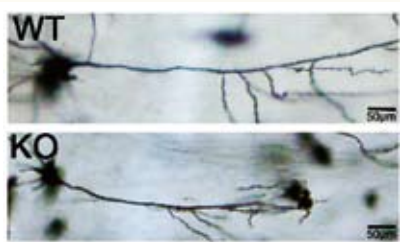
## NTU INTRODUCES WORLD'S FIRST CHINESE-LANGUAGE MASSIVE OPEN ONLINE COURSES

Two professors at Stanford University launched Coursera, a website offering a new generation



of free on-line courses, in April 2012. Different from OpenCourseWare, Coursera provides interactive courses, coursework, examinations and certificates, and is available free of charge around the world.

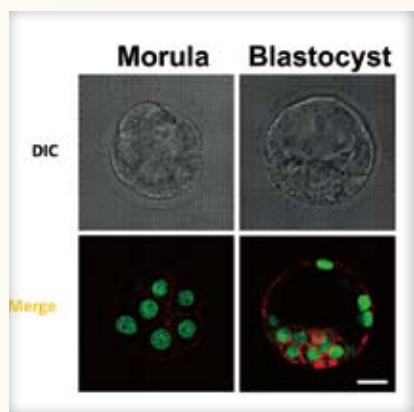
Having been invited to partner with Coursera, NTU introduced the world's first offering of Chinese-language massive open online courses (MOOC) at the end of August. This includes "Ancient Chinese Historical Figures: Qin Shihuang" (with Prof. Shih-Hao Lu of the Department of History) and "Probability" (with Prof. Benson Ping-Cheng Yeh of the Department of Electrical Engineering). In the coming months, new courses will be going online, including "Introduction to Optics" (Prof. Shi-Wei Chu of the Department of Physics) and "Machine Studies" (Prof. Hsuan-Tien Lin of the Department of Computer Science and Information Engineering).



Ⓐ The altered apical dendrite morphology of the hippocampus CA1 neurons in a gene Y knockout (KO) line.

Recent advances in biotechnology have permitted researchers to engineer genetically modified mice using such approaches as transgenesis, gene knockout and embryonic stem cell cultures. The awarding of the Nobel Prize in Physiology or Medicine in 2007 for the creation of genetically modified mice highlights the importance of this technology to the field of medical research.

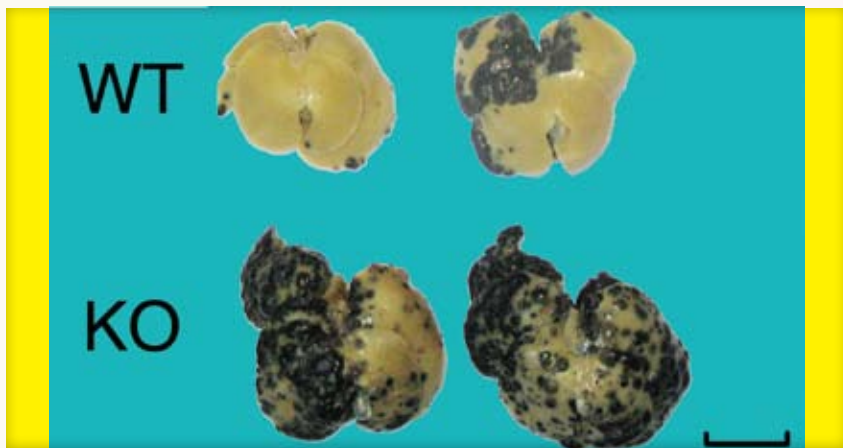
Here at NTU, investigators led by Prof. Shu-Wha Lin of the College of Medicine's Department of Clinical Laboratory Sciences and Medical Biotechnology have been using gene knockout mice to conduct research into genetic functions since 1995. Prof. Lin's research team has introduced a wide variety of genetically modified mice and developed numerous



Ⓐ Live images of homozygous R26-GR pre-implantation embryos at morula and blastocyst stages.

mouse models for specific genetic diseases, including infertility, abnormal embryonic development, abnormal blood coagulation and microcephaly.

## PROFESSOR LEADS DEVELOPMENT OF GENE KNOCKOUT MICE



Ⓐ The appearance of metastatic tumor colonies on the WT and gene X knockout (KO) mice 12 days after intrasplenic injection of melanoma cell line B16F1.

Last year, the research team published a number of new findings. The team introduced gene knockout mice that allow cancer cells to readily metastasize in the liver (*Hepatology*, 2012). This research demonstrated that only by using animal models based on the mouse, which has a similar physiology to that of humans, will scientists be able to explain fully the genetic functions of humans.

Prof. Lin's team also collaborated with Prof. Li-Jen Lee of the Graduate Institute of Anatomy and Cell Biology to develop gene knockout mice with a mental disability. The phenotypes of these mice reflect symptoms similar to those produced by the same genetic mutation in humans. The researchers further analyzed the brains of these knockout mice and discovered that the gene they had targeted influences the growth of neural dendrites when it mutates. This finding shows potential to help in the development of new drugs to treat diseases caused by the lack of this gene (*Human Molecular Genetics*, 2012).

Prof. Lin and his researchers also joined Prof. You-Tzung Chen of

the Graduate Institute of Medical Genomics and Proteomics to develop genetically modified tool mice with dual-color fluorescence reporter genes. These mice are capable of expressing fluorescence throughout their bodies and can be used by scientists to conduct in vivo cell tracking imaging research (*PLoS ONE*, 2012).

Prof. Lin participated with the NTU Research Center for Medical Excellence in the planning and establishment of the Gene Knockout Mouse Core Laboratory beginning in 2002. Later, with support from the National Science Council National Research Program for Genomic Medicine and a maintenance and operation project for biotechnology core facilities, she promoted the establishment of the nation's only Transgenic Mouse Models Core Facility.

Since 2005, Prof. Lin has assisted researchers from major research institutes and hospitals around Taiwan by successfully developing 221 types of gene knockout mice that can pass on their genetic traits. She has also joined these researchers in presenting 39 papers in international journals.



# NTU at a Glance

## Freshmen Learn Library Services Through Games



NTU Library arranged two fun games to help this year's incoming freshmen get to know the library's useful services and resources.

Hide and Seek was held in NTU Library from August 20 to September 30. The game called on the students to find eight questions about using the library that library personnel had hidden in different locations on the library's premises. Some questions were to be found in some of the library's most interesting reading areas, including NTU Collected Works on the third floor and the special collections on the fifth floor, while the others were hidden in places that students visit most frequently, namely, the Circulation Desk, Music Bay and Multimedia Center.



Once the students had located and answered a question they would receive an ink stamp on their game cards. Students who collected all eight stamps not only received a special

prize, they also left with a basic understanding of the library's facilities and services.

The Exploration Amusement Park Game is actually an on-line course composed of 12 small games that introduce the library's services and resources. For instance, a crossword puzzle familiarizes players with the library's periodicals resources while a tic-tac-toe game challenges players' knowledge of the rules for checking out library materials.



# NTU Ranked 82nd Among World Universities

Quacquarelli-Symonds announced its 2013 QS World University Rankings in September and NTU garnered a ranking of 82nd, making it the sole university in the nation to make it into the world's top 100.

In this year's rankings, NTU's overall score climbed from 69.9 out of 100 in 2012 to 72. Compared to 2012, the university's scores all improved in the categories of academic reputation (score: 97.50/rank: 39th), employer reputation (76.40/121st), faculty/student ratio (39.90/418th) and paper citations per faculty (77.40/95th), while they fell slightly in the categories of international faculty (17.50/460th) and international students (14.90/54th). NTU's score for paper citations per faculty increased greatly this year, indicating that the quality of the university's research papers and its capacity for academic research continue to improve.

NTU has gained great momentum from the Ministry of Education's Aim for the Top University Project and it will continue to introduce top-notch, forward-looking cooperation projects that take advantage of its strengths. We will persist in our efforts to pursue academic exchanges and cooperation with the world's leading universities and research institutions, hire outstanding local and international faculty and enhance our influence within the international academic community, as we promote comprehensive improvements in education, research and internationalization on our way to joining the ranks of the world's premier universities.



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