



National Sun Yat-sen University

2019 Annual Report of

Higher Education **SPROUT** Project



Introduction

Founded in 1980, National Sun Yat-sen University is located on the coast in Kaohsiung overlooking Sizihwan Bay. As the only university with a seaside campus in the country and the top university in Southern Taiwan, NSYSU specializes in marine sciences education and research, while also viewing participation in the development of the Kaohsiung metropolitan area as an important part of its mission.

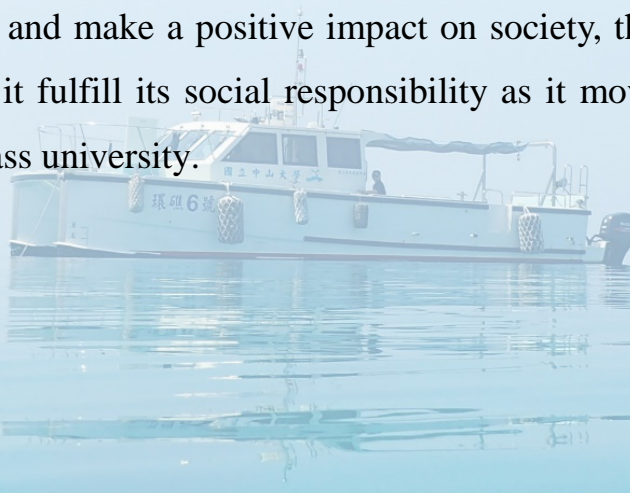
NSYSU was established forty years ago as a small research university composed of colleges of humanities and sciences. Today, the university comprises seven colleges (the College of Liberal Arts, College of Science, College of Engineering, College of Management, College of Marine Sciences, College of Social Sciences, and Si Wan College) with twenty-one departments, forty-two Master's programs, fourteen in-service Master's programs, and thirty-one doctoral programs. As of the fall semester of the 2019 academic year, NSYSU had 9,563 students and 502 full-time instructors, making it the leading academic institution in Southern Taiwan.

According to Essential Science Indicators (ESI) 2019 data, NSYSU scientific papers were featured in nine different fields of research and performed in the top 1% based on the number of citations received. This is a testament to NSYSU's exceptional research and development capabilities. NSYSU placed ninth in Cheers Magazine's 2019 national survey of universities whose graduates are most favored by businesses. NSYSU was listed in the 2019 Quacquarelli Symonds (QS) World University Rankings by Subject in fifteen different subjects (the highest number of subjects achieved by NSYSU), placing it fifth among Taiwanese universities. Compared to the previous year's rankings, NSYSU was listed in three additional subjects—Agriculture and Forestry, Biological Sciences, and Accounting and Finance—the largest increase among Taiwanese universities. In the 2020 QS World University Rankings by Subject, NSYSU was listed in at least two subjects in each of five subject areas: Arts and Humanities, Engineering and Technology, Life Sciences and Medicine, Natural Sciences, and Social Sciences and Management. In the 2020

QS World University Rankings announced in June 2019, NSYSU placed 410th in the world and ninth in Taiwan.

In January 2019, NSYSU submitted its first application for the establishment of a College of Medicine, including a Post Graduate Department of Medicine, Institute of Biopharmaceutical Sciences, Institute of Precision Medicine, and Institute of Medical Science and Technology doctoral program. The Ministry of Education has approved the establishment of the latter three. However, the proposal to establish the Post Graduate Department of Medicine must first be reviewed by the Taiwan Medical Accreditation Council (TMAC) for approval and then assessed by the Ministry of Health and Welfare regarding the demand for government-sponsored medical students and the amount of resources furnished by NSYSU. After these evaluations, the Ministry of Education shall proceed to review the proposal for the department, which will form a cornerstone for the large-scale development of NSYSU's College of Medicine.

As NSYSU prepares for its 40th anniversary, we wish to further upgrade the university's diverse, innovative, and adventurous student body. We set three targets—improving talent development to facilitate social mobility, increasing international academic competitiveness, and spurring regional growth and development—for investing Higher Education Sprout Project funds into the university's education, research, international exchange, and industry-academia collaboration measures, as well as into NSYSU's newly established departments in the field of medicine. These measures will help us achieve our targets to improve talent development, increase international academic competitiveness, and make a positive impact on society, thus spurring NSYSU's growth and helping it fulfill its social responsibility as it moves towards its goal of becoming a world-class university.



Project Status

I. Educational Innovation and Improvements in the Quality of Education

(I) Establishment of Si Wan College for interdisciplinary skills development

To promote holistic, interdisciplinary skills development at NSYSU, Si Wan College was established in the summer semester of the 2018 academic year and is structured as an independent college. Si Wan College was established by merging the Center for General Education with the Interdisciplinary Studies Program (established in the 2018 academic year), and has two additional research centers under it. The Ministry of Education has approved student recruiting for the Interdisciplinary Studies Program starting in the 2020 academic year. NSYSU also plans to establish an independent graduate school for sustainable operations and social innovation in the 2021 academic year. Si Wan College is committed to the development of young interdisciplinary talent with broad-based skill sets and the ability to integrate a range of resources. In tandem with NSYSU's six major colleges, Si Wan College promotes interdisciplinary learning and provides an educational environment that offers lateral growth and broad-based development built upon a solid general education foundation.

(II) Interdisciplinary Collaborative Learning Programs to Develop Innovative, Interdisciplinary Talent

In the 2019 academic year, NSYSU offered sixteen different topic-oriented collaborative learning programs in an effort to promote interdisciplinary learning. The programs brought instructors from different fields of study together to provide students with one professional sub-program, eighteen integrated sub-programs, and seventeen micro-programs. In the 2019 academic year, a total of 4,671 students participated in these programs. Through student surveys, NSYSU has found that students who joined our collaborative learning programs have a more comprehensive

plan for their future, are capable of utilizing more learning strategies, have a better learning experience, and are more motivated to learn.

1. ORCA-STEAM

This program aided the Taiwan International Ports Corporation in organizing the Smart Ports Forum and Workshop, which focuses on blockchain technology applications in logistics and port management.

2. Marine Biology Resources

This program included a graduation exhibition showcasing the uses and applications of marine resources to provide viewers with knowledge about the development and protection of marine resources as well as their applications.

3. Ecological Sustainability

The program utilized several fields of study to help students learn about the current state of the local environment and ecology and acquire a deeper understanding of local culture, coastal landscapes, and biodiversity.

4. Kaohsiung Studies

The Cultural and Creative Community Design course offered a series of courses that help students examine how community members perceive, imagine, and organize their own culture.

The Social Gerontology course developed innovative local projects that focus on intergenerational interaction, so as to cultivate talent for elder care services.

5. PM2.5 Aerosols, the Environment, and Life

Five seed teacher training workshops were organized to bring knowledge of air pollution to K-12 education. The special exhibition *From Haze to Helios: PM2.5 Visual World* was an interdisciplinary collaborative learning event that displayed exhibits designed by NSYSU together with art exhibits from the National Museum of Natural Science's *PM2.5 Visual World* exhibition.

6. Immersive Experience

This program taught students to create interdisciplinary applications in a variety of fields including entertainment, education, and assisted physical rehabilitation. It combined expertise in electrical controls, musical composition, and scenario design to create applications that provide users with dynamic, and interactive experiences.

7. Expressive Arts and Elder Care

The Music in Elder Care Design and Applications course combined expertise in applied music studies with industrial design to incorporate musical activities into elder care. Students visited an adult day care center for hands-on learning and developed music-related assisted living activities and senior assistive devices.

8. Cross-Cultural Studies and Aesthetics

In this program, students examined the works of poet Yu Kwang-Chung and created handmade bookmarks with Hokkien texts. A writing workshop was also held and its submission of the works of participating students to the Kaohsiung Museum of History's *2018 Kaohsiung Stories* creative project was accepted. The program ended with a wind ensemble performance and a stage performance of *A Woman of No Importance*.

9. Food Safety

This program took an interdisciplinary approach to finding solutions to food safety issues. Food safety experts in various fields were invited to give lectures at NSYSU. Students were given industry tours and food industry internship opportunities.

10. Industry-Oriented Learning and Placemaking

The Long-Term Care course organized took students to visit well-known senior centers and the Placemaking and Regional Governance course used trips to Liugui and Meinong to teach students how their local cultural industries and communities operate through hands-on experience. The program also organized tours of overseas nonprofit organizations, non-governmental organizations, and social enterprises to broaden the students' horizons.

11. Financial Technology

A workshop with a wide range of topics was set up to allow industry experts to share their hands-on experience with our students. 154 students in different fields attended a big data contest workshop to demonstrate their exceptional creativity and innovative thinking.

12. Semiconductor Electronics

This program provided students with advanced components manufactured by major Taiwanese technology companies, including TSMC, UMC, AUO, and Innolux. The program also trained students to perform IV measurement on components, conduct data analysis and collation, and apply scientific thinking.

13. Artificial Intelligence of Things

Students studied basic concepts in Chinese medicine and computer science and used them to develop solutions and interdisciplinary applications that combined the observational diagnosis method used in Chinese medicine with computer image processing. The program also trained students in independent thinking and problem-solving skills.

14. Interdisciplinary Smart Manufacturing

The program imparted knowledge in forward-looking interdisciplinary smart manufacturing. It also offered a practicum course on cloud manufacturing systems and a smart manufacturing course.

15. Smart Cities and Intelligent Transport

The Smart City Electronic Purse Tour project encouraged students to experience the public transportation services of Kaohsiung City and provided a glimpse into the convenient urban life that will be possible in the future thanks to electronic purses.

16. Cultural Diversity and Social Innovation

Taiwanese Culture Week featured a variety of activities including keynote speeches, film lectures, folk arts parade performances, and an on-campus outdoor banquet. The event helped NSYSU



faculty and students learn more about Taiwanese cultural traditions such as folk arts parades and outdoor banquets. *Manual Laborers of Caoya, Cianjhen: A Life of Craftsmanship* was a special exhibition that told the life story of six local elders from Caoya, Cianjhen. The exhibition was designed to help visitors learn about the lives of manual laborers in Cianjhen and the value of their work. The *Labor Narrative Writing Workshop* exhibition encouraged students to observe their home environment and use narrative writing to define the value of labor, thus enhancing their autonomous learning abilities through competency-based education.

(III) Off-Campus Workshop Series

A total of five off-campus workshops were organized in the first half of 2019. Each was a testament to the positive impact of interdisciplinary collaborative learning on society. Students from several different departments were guided by advisors in business collaborations, visiting several off-campus sites—Aogu Wetlands (Chiayi), Jinguashi (New Taipei), Taipei City, the Cijin, Gushan, and Yancheng Districts (Kaohsiung), and Qixingtan Beach (Hualien)—to learn about local cultural and development challenges in order to come up with strategies to boost local development.



(IV) Let's Try Collaboration with NSYSU—NSYSU's Achievements in Innovative Collaborative Learning and Social Responsibility

It has been one year since NSYSU launched its collaborative learning programs. To showcase the students' achievements over the past year, NSYSU organized the 2nd Si Wan collaborative learning Seminar, titled *Let's Try Collaboration with NSYSU*, at the Pier-2 Art Center on September 28, 2019. The event included a seminar and interactive exhibits. Instructors and students participating in the sixteen collaborative learning programs were invited to give short speeches on interdisciplinary talent development, using themes related to interdisciplinary collaborative learning to raise awareness of the United Nations Sustainable Development Goals (SDGs) and encourage the public to find solutions to global issues. The interactive exhibits showcased NSYSU's achievements in its collaborative learning programs. The interactive exhibits also introduced visitors to collaborative learning and to raise public awareness and encourage discussion of social and environmental issues for the purpose of sustainable local development. To utilize interdisciplinary collaborative



learning and bring technology and the humanities together from their traditional positions at opposite ends of the educational spectrum, NSYSU launched the collaborative learning programs as a platform for people in different fields of expertise to work together. The collaborative learning programs also strengthen the connection between higher education and society and gives students a head-start in transitioning from academia to industry.

(V) The Creativity Realization Base and Multifunctional Interactive Classrooms: A Hub for Interdisciplinary Collaborative Learning

From 2018 to 2019, NSYSU renovated the 10th floor of the Info-Library Building to establish the Creativity Realization Base, which opened during the summer semester of the 2019 academic year. The space tapped into NSYSU's creative and innovative energy to develop interdisciplinary teams of faculty and students to tackle industrial, social, and international issues. In the past three years, NSYSU has also adopted a flipped classroom approach in its colleges and has

currently developed thirty-four multifunctional interactive classrooms that allow synchronous online teaching and participation in international web conferences. To improve teaching quality, NSYSU has upgraded its teaching equipment over the years and replaced the teaching equipment for its academic units and core courses.

(VI) Developing a Collegiate System to Provide Diverse Learning Pathways

To achieve innovative education and make progress toward digitalization and internationalization, NSYSU is continuing to implement its plan for a collegiate system that facilitates interdisciplinary collaboration between the different colleges to support learning through a diverse combination of courses.

1. College of Liberal Arts: The College of Liberal Arts has adopted an interdisciplinary teaching approach to strengthen the connection between humanities, the arts, and the performing arts, while also incorporating the resources provided by the Ministry of Education and the Ministry of Science and Technology. A team consisting of the college's instructors has worked in tandem with another team from the Ministry of Science and Technology to conduct field studies on the Guomao Community in Zuoying District. The teams first gained the trust of the residents and then interviewed them to extract their life stories. The resulting *Crossing Zuoying* experimental exhibition was held at the end of May 2020. It explored both personal recollections and collective memory to rejuvenate the shared imagination of this community.

2. College of Science: The College of Science has adjusted and strengthened its core courses—*Chemistry Laboratory*, *Special Lectures on Industrial Chemistry*, *Experimental Physics*, *Biotechnology Laboratory*, *Principles of Artificial Intelligence*, *Statistical Learning and Data Mining*, *Fundamentals of Manifold Learning*, and *Python and Machine Learning Algorithms*—and recorded introductory courses for students to take online. The college fulfills its social responsibility by providing educational resources for students in high school science classes and those participating in the Biology and Mathematical Olympiads.

3. College of Engineering: The College of Engineering has introduced several new capstone courses:

- Department of Mechanical and Electro-Mechanical Engineering
 - Seminar in Mechanical and Electro-Mechanical Engineering (I)
 - Seminar in Mechanical and Electro-Mechanical Engineering (II)
 - Practical Electro-Mechanical Engineering Project
- Department of Electrical Engineering
 - Capstone Project (for six different major fields)
- Department of Materials and Optoelectronic Science
 - Capstone Project in Materials and Optoelectronic Science
- Department of Photonics
 - Photonic Components and System Applications
- Department of Computer Science
 - Capstone Project

This year, 146 teams participated in the school's inter-departmental capstone project competition. Industry experts were invited to serve as jury members. Besides, local high school students were invited to visit the college and observe the event in order to learn more about the college and its departments.

4. College of Management: The College of Management combined teaching and educational resources to create a co-teaching system for foundation courses, and also established two new programs: *Fundamentals of Integration Management* and *Current Society and Business Trends*. The *Fundamentals of Integration Management* program consists of in-person courses along with an additional 15-18 hours of online courses, including courses in economics, management, and financial statements, for non-traditional students of regular or in-service MBA programs to take in advance of the program.

5. **College of Marine Sciences:** The College of Marine Sciences developed college-wide required freshman courses that are in keeping with the college's core courses—*Basic Marine Sciences* for the fall semester and *Applied Marine Sciences* for the summer semester—to develop interdisciplinary skills. The college also organized two capstone courses: *Shipboard Operations Practice* and *Capstone Project in Marine Sciences*.

6. **College of Social Sciences:** In response to the lowered minimum credit requirement for required courses in its departments, the College of Social Sciences organized general introductory courses to offer students greater flexibility in course selection. The introductory courses—*Introduction to Political Science*, *Introduction to Economic Science*, *Introduction to Social Science*, *Introduction to Psychology*, and *Introduction to Law*—train students in a wide range of social science disciplines and improve their interdisciplinary knowledge. To improve students' programming skills, information literacy, and hands-on program design skills, the College of Social Sciences and Si Wan College co-organized two courses: *Creative Programming* and *Program Thinking and Media Capability Development*.



(VII) Creating a Teaching Support Service in our Role as the Southern Base for the Teaching Practice Research Program

In recent years, NSYSU has developed a teaching support system to encourage instructors to adopt innovative teaching approaches. In addition to continuing to hold seminars and workshops and adopting microteaching and teaching incentives, NSYSU adopted an in-class peer review system and teacher professional learning community as part of its Higher Education SPROUT Project. In-class peer review and topic-oriented discussion are employed to help instructors improve the teaching environment. Since the project's implementation, NSYSU has carried out eighteen interdisciplinary group projects for instructors. In 2019, 362 people participated in the campus-wide innovative teaching workshop (an increase of 65% compared to the previous year), and 164 instructors (approximately 31% of all NSYSU faculty) were among the participants. This year, to encourage instructors to adopt innovative teaching approaches, NSYSU formulated its *Basis of Funding Payment for R&D of Teaching Material or Course* to encourage instructors to develop course materials and apply for compensation for their work. In the 2018 academic year, NSYSU established a new instructor promotion track for educational research. Each college may stipulate their own scoring weights for promotions in different aspects of the educational research track, thus providing instructors with another route to promotion. To promote the internationalization of teaching, NSYSU sponsored overseas training for four instructors in 2019 and helped them bring back new pedagogical knowledge to share with their NSYSU peers.

NSYSU also encourages instructors to apply for the Ministry of Education Teaching Practice Research Program and has created a webpage to provide them with new pedagogical knowledge. NSYSU holds regular Teaching Practice Research Program Discussion Sessions with different colleges and invites participating instructors to share their experiences, thus accumulating educational experience in NSYSU. In 2019, seven of these sessions were held. A total of twenty-seven projects submitted by NSYSU faculty were approved in the 2019 academic year, an approval

rate of roughly 70%. The projects submitted by NSYSU spanned seven major categories, with the number of approved projects in the University Social Responsibility (USR) category being the highest among universities in Taiwan. Starting in 2020, NSYSU was chosen by the Ministry of Education as the southern base for the Teaching Practice Research Program. This demonstrates that with the university's support, the NSYSU faculty is an exemplar in combining education with research.

(VIII) Credit Flexibility and Innovative Teaching Approaches to Help Students Develop Autonomous Learning Abilities

1. The *NSYSU Guidelines on Micro Credits* Offers Students Variety and Flexibility in Course Choices

In order to encourage autonomous and flexible learning, NSYSU formulated its *NSYSU Implementation Guidelines on Micro Credits*, which stipulates that instructors may establish micro-credit courses on certain topics without restrictions on the form that they take. In principle, 0.1 credit is assigned for every two lecture hours of a micro-course. Micro-course participation points may be used by students for certification. Students who participate in eighteen or more lecture hours in micro-courses can collect one elective course credit. In 2019, 361 students participated in thirty-eight different micro-courses in various fields of study, providing them with a range of learning options.

2. Digital Self-Paced Learning

In order to promote autonomous learning, NSYSU launched a digital self-paced learning program. Starting from this year, NSYSU colleges provide lists of recommended online self-study courses offered by sister universities overseas or international online learning platforms (e.g., Coursera, edX, FutureLearn, Udacity, Udemy, etc.). Students earn at least one elective course credit for each course taken. NSYSU can provide each student with a subsidy of up to NT\$4,000 (the subsidy for

each course is limited to NT\$2,000) once the student has paid for the certificate of completion or verification. Faculty can be reimbursed for the full cost.

3. A Diverse Range of Innovative Courses that Meet the Needs of Instructors

Due to differences in teaching methods, instructors have different needs for innovative courses. NSYSU faculty can propose to organize their courses in a variety of ways based on their teaching needs. In 2019, NSYSU opened twenty-eight innovative courses and established a performance review system for them. The reviews were included in the course evaluation for the fall semester of the 2019 academic year.

4. Innovative Degree Paths

NSYSU has adopted several innovative degree paths, including the Undeclared Major Bachelor's Program, Five-Year Bachelor's and Master's Program, Seven-Year Combined Degree Program, and NSYSU Dual Degree Program (available for both Master's and doctoral degrees). These innovative degree paths provide students with a range of learning options. The NSYSU-KMU Aim for the Top Alliance allows students from both universities to transfer to the other school in the same way that they would change their major. This public/private university collaboration model is the first of its kind in Taiwan. Eleven students transferred schools between 2017 and 2019, giving them another option to help them develop their full potential.

(IX) Multiple Assessment Methods to Encourage Diverse and Innovative Teaching Approaches

To improve the pedagogical skills of NSYSU faculty, NSYSU adopted multiple assessment methods to help instructors accurately assess student learning outcomes and provide them with instant feedback, effectively improving their teaching. In addition to assessing student learning outcomes, NSYSU also conducted an analysis of classroom assessment techniques (CATs) and will categorize these methods for the

faculty to use. CATs were utilized in five courses in the fall semester of the 2019 academic year.

(X) Improving Students' Core Competencies: Establishing a Talent Development System for Chinese Language, English Language, and Information Skills

1. The Si Wan Reading Project to Improve Chinese Reading and Writing Abilities:

To improve students' Chinese reading and writing abilities, the Department of Chinese Literature organized the *Si Wan Reading Project for Literature, Culture, and Creative Applications*. The project consists of courses in three major categories: Fundamental Core Courses, Creative Modern Applications of Classical Literature, and Theory and Practice of Contemporary Literature. Using self-developed teaching materials and a Google Site showcasing local features of Kaohsiung, the courses helped students improve their Chinese competence and writing skills. Starting from the fall semester of the 2019 academic year, pre- and post-course Chinese reading and writing skills evaluations have been carried out to gain a better understanding of student learning outcomes and growth.

2. English Education in Diverse Cultural Contexts to Improve English Reading and Writing Abilities

The 4C (Communication, Communities, Connections, Cultures) Program was designed for this project to encourage creative expression and the adoption of task-based assessment of independent studies and group activities. A variety of pathways, including on- and off-campus English proficiency tests, were provided this year to help students meet the English language proficiency graduation requirement. In the 2019 academic year, NSYSU used the Oxford Online Placement Test to assess the English language proficiency of NSYSU students and adjust future courses accordingly. A campus-wide English writing competition and the English Plaza were also held to help improve students' English proficiency.

3. Organization of Special Programming Courses Designed by Different Colleges to Help NSYSU Students Learn Programming Logic

This year, the College of Social Sciences developed two new courses: *Creative Programming* and *Program Thinking and Media Capability Development*. Teaching materials were specifically designed for non-CS students to improve the teaching quality and student learning outcomes. Another course, *Local Narrative Position Game Design*, which combined programming skills with studies in the humanities, was taken by many students of the College of Liberal Arts. NSYSU will continue to develop special programming courses in the hope that within three years, 90% of future NSYSU graduates will have completed a programming course prior to graduation.



(XI) Interdisciplinary Integration and Action Learning in General Education Courses

NSYSU's general education courses have been developed in keeping with the university's policy to enhance students' core competencies, interdisciplinary abilities, and innovativeness. In addition to courses in languages and culture, logic, programming, and inter-college general courses, liberal arts courses, service learning

courses, and sports and health courses, NSYSU is adjusting its general education courses towards interdisciplinary integration and action learning.

1. Restructuring General and Interdisciplinary Education

In response to a changing higher education environment, NSYSU established Si Wan College in February 2019 as part of its organizational restructuring. Si Wan College was established by merging the Center for General Education with the Interdisciplinary Studies Program, and is a college unique to NSYSU.

2. Rewriting the Rules of the University Seminar to Create an Interdisciplinary Learning Environment

The first *Experiential Camp for the Way of Great Learning* freshman event was held from September 2-3, 2019. Honorary Chair Professor Jing-Jyi Wu was invited to plan the event with twelve other instructors from different NSYSU colleges. 120 freshmen of the 2019 academic year participated in the event, taking part in individual and group activities that encourage introspection and cooperative learning.

3. Integrated/Interdisciplinary Courses to Develop Interdisciplinary Learning Abilities

The first Taiwanese Culture Week was held in 2019. It was centered on folk arts parades and an outdoor banquet, both elements of traditional Taiwanese culture. The event also featured activities planned in tandem with general education courses and the Co-Working at Dorm project. Off-campus performers (San-Tai-Zi, an all-female Ba-Jia-Jiang troupe, Qiye and Baye, traditional banquet caterers, parade floats, etc.) were invited to perform at the university to increase awareness of traditional culture among the students. For the Midsummer Night's Dream in Yanchengpu event nine art installations were installed in a local community in Yancheng District, breathing new life into the old community and setting a successful example of bringing creative innovation from the university to a traditional market.

4. Aquatic Sports and Physical Education Courses, Including a Beginning Archery Course Using a Basic Compound Bow

In addition to physical education courses in swimming, sailing, diving, and archery, NSYSU also organized introductory events for laser sailing, windsurfing, and stand up paddleboarding to improve the learning outcomes in aquatic sports.

5. Service Learning to Fulfill the University's Social Responsibility

NSYSU's service learning courses are split into six categories: popular science education, care for the underprivileged, civics, community innovation, international volunteering, and on-campus service. In 2019, NSYSU organized a training course for students to serve as international volunteers at a religious institution in Osaka, Japan. Students who took the course learned to live abroad, communicate with strangers, and observe differences between Taiwanese and Japanese lifestyles.



(XII) A Range of Admissions Channels Help Students Reach Their Full Potential

NSYSU offers a variety of channels for students to apply for admission to the school. In the 2020 academic year, the university's admission channels include: Special Admission (the Talent Search Program), the Multi-Star Program, individual applications (regular applications, the Southern Star Program, and the Si Wan Southern Star Group Admissions Program), individual admissions of talented student athletes, the TVE joint college entrance examination (for regular students and

students participating in the Youth Early Employment Program), admission via examination and placement (AST), the admission of physically or mentally challenged students via screening, and the admission of talented student athletes via screening. In the 2018 academic year, NSYSU established its Recruitment Office to develop and handle oversight of student admissions channels, thus enhancing the long-term development of NSYSU's admissions system.

In response to the changes to entrance exams and university admissions planned for the 2022 academic year, NSYSU has increased its admissions quota for individual applications, established a joint application channel for students seeking direct admission into doctoral programs, and developed college-wide interdisciplinary doctoral degree programs. NSYSU also opened the laboratories of the College of Science and the College of Engineering to high schools participating in the Strategic Alliance and those in Southern Taiwan, allowing them to organize their own hands-on courses. These measures have helped both NSYSU and local high schools develop their own specially designed courses.

(XIII) Assisting in the Development of Competency-Based Education for the New Curriculum

NSYSU's Institute of Education and Center for Teacher Education invite domestic educational experts to come to the school and instruct faculty and students on topics and practices related to the Ministry of Education's new curriculum guidelines, thus improving students' understanding of how to implement the new curriculum.

NSYSU also continues to implement the *Professional Learning Community Project* and the *New Curriculum Workshop Project for Pre-Service Teachers* to enhance pre-service teachers' ability to develop competency-based courses.

NSYSU provides subsidies for instructors who teach classes at National Pingtung Girls' Senior High School in an effort to help physics teachers develop the skills they need to develop their own courses. NSYSU also promotes the inclusion of

air quality education into K-12 education and helps schools in Kaohsiung teach their faculty and students about air pollution.

II. Improving the Accessibility of Higher Education

(I) Expanded Admissions and Guidance Program for Disadvantaged Students

(1) Expanded Admissions Program for Disadvantaged Students

NSYSU began admitting students through its pioneering Southern Star Program in the 2008 academic year and has continued to promote its Multi-Star Program ever since. To help outstanding students from financially insecure families, NSYSU also established the Si Wan Southern Star Group Admissions Program to give priority to disadvantaged students in the admissions process. The Talent Search Special Admissions Program also reserves spots for disadvantaged students, thus increasing their chances of being accepted by NSYSU. In the 2019 academic year, NSYSU offered 169 places for students applying through the Multi-Star Program, sixty-eight places for disadvantaged students applying through the Southern Star Program, twenty-two places for disadvantaged students applying through the Si Wan Southern Star Group Admissions Program, and fifty-six places for disadvantaged students applying through the Talent Search Special Admissions Program. The actual number of admissions was 222.

To provide equal opportunities for education and achieve social equality, NSYSU organizes student recruitment fairs and invites high school students from Central and Southern Taiwan and their families to participate in and learn about the various departments at NSYSU. In the 2019 academic year, a summer camp was jointly organized by all NSYSU departments to provide participating high school students with a unique summer experience and motivate them to excel academically and enroll in NSYSU.

2. Comprehensive Economic Assistance Program and Student Development Program

A percentage of NSYSU's income from tuition and miscellaneous fees is put towards funding government-sponsored scholarships and NSYSU scholarships. Between 2011 and 2019, over 15% of income was used in this way, an amount far higher than the 5% stipulated by the Ministry of Education for providing assistance to disadvantaged students. The scale of these subsidy programs and scholarships helps NSYSU achieve its goal of providing financial aid to students who strive for excellence.

To help disadvantaged students further their education, NSYSU provides scholarships for students from low-income families as well as student loans, subsidies, on-campus work, financial aid subsidies, and emergency aid subsidies. An annual scholarship fund of NT\$100,000 is provided to allow students from middle- to low-income families eliminate their financial concerns so that they can focus on their studies. An academic studies guidance mechanism was also established to provide disadvantaged students with monetary rewards for academic excellence. Disadvantaged students are rewarded for completing coursework in certain skills.

Using donations from alumni and other compassionate individuals, NSYSU established a special subsidy at the end of 2016 to help disadvantaged NSYSU students take part in overseas programs. In 2019, eight students were approved for subsidies totaling NT\$2.78 million.

NSYSU has been active in inviting businesses to participate in its job fair for the students and graduates of the Kaohsiung and Pingtung regions. Over the years, the job fair has maintained a satisfaction rate of over 95% among both businesses and job seekers. NSYSU also screens off-campus internship programs for its students and encourages them to familiarize themselves with hands-on work opportunities. Internship insurance is provided to ensure their safety during their internship period.

(II) Campus Resources and Community Sharing

The goal of the NSYSU Social Engagement Center is to support the university in carrying out its social responsibility for the development of higher education. The center organizes interdisciplinary University Social Responsibility (USR) projects led by instructors and attended by students, including:

- Establishing an Ecommerce Ecosystem for Farming Villages—New Technology for Old Communities
- The City as a Commuseum—Socially Embedded Community Engagement
- Localized Education and Globalized Operations—Starting from the Old Port and New Bay Communities
- Industry-Academia Cooperation and Local Inclusion—A University Cooperative Empowerment and Extension Service Project

These projects deal with local problems by getting involved with communities in the Kaohsiung metropolitan area. By developing solutions and combining local resources to provide assistance, we help local residents increase their awareness of the significance of the university's existence. In regard to its sixteen topic-oriented co-learning programs, NSYSU organized five off-campus workshop series in the first half of 2019, along with the Si Wan Co-Learning Seminar/Exhibition that took place on September 28. These events demonstrated NSYSU's social responsibility and the interdisciplinary co-learning spirit of the faculty and students.

(III) Professional Institutional Management System

The NSYSU Office of Institutional Research has established an integrated database for institutional research capable of connecting to different systems, which facilitates institutional research, institutional evaluations, and departmental self-evaluations. Research, academic, and student affairs data have been compiled and uploaded into the database. Data from other information platforms have also been imported to further update the database. Tasks accomplished this year include:

1. Inclusion of the information compiled from faculty feedback and student surveys
2. Acquisition of viewing permission from the Office of Library and Information Services for submitting information related to NSYSU's global rankings to various publishers publishing global university academic rankings.
3. The NSYSU Office of Institutional Research established a system for other NSYSU units to apply for data use and analysis. Starting from the 2018 academic year, the Office of Institutional Research has also been responsible for the Institutional Overview and Indicators System and for its submission to and integration with the Ministry of Education's Higher Education Database. Through these changes, NSYSU is able to screen information related to university governance and improve its professional administrative capabilities.

To effectively utilize the data in its database for institutional research, NSYSU has independently developed its Information Platform for Institutional Research with Tableau data visualization software. Through the use of the system's modularized data, users can easily acquire information with quick filters, thus enhancing their control of the information. The database can be used to convert institutional data into institutional information for publication. With the data visualization function, NSYSU can provide transparent, open, and accurate information, so that the university's policymakers, faculty, students, and stakeholders can gain a better understanding of the institutional outlook. Tasks accomplished this year include:

1. Regular updates of the Information Platform for Institutional Research to help the public learn more about the university and mitigate negative impacts due to information asymmetry.
2. Viewing permissions for the internal administrative query system were granted to secondary level supervisors to allow them to better assist with policymaking.

3. Software and hardware configuration adjustments: (1) Web server upgrade; (2) Independent web testing environment to separate testing and development from regular operation.

NSYSU has also shared its experience in data processing and database building, organizing internal institutional research workshops that focus on big data, data mining, and other topics to enhance the professional capabilities of its institutional researchers.

III. Special Features of NSYSU and Fulfilment of Social Responsibility

(I) Ocean Teaching and Research Watch

NSYSU places great emphasis on the study of the global carbon cycle and environmental changes as well as the development of underwater vehicles and natural marine products with medical applications. NSYSU also pursues the issues of ocean acidification and biodiversity in its research and education; please see “[NSYSU Research Highlights](#)” for more research results. In addition to conducting academic research, NSYSU also maintains contact with international scholars to broaden its research perspectives and enhance its international influence.

(II) Tackling Social Issues

1. Rapid Detection for Food Safety

NSYSU has developed professional technologies and talent to counter Taiwan’s numerous food safety issues. Professor Shiea Jentaie of the Department of Chemistry developed a mobile ambient mass spectrometer that can instantly detect harmful chemical additives (pesticides, melamine, plasticizers, preservatives, etc.) in daily necessities, cosmetics, foods, and drinks. As the technology is capable of completing screening and analysis within three seconds, it can serve as the first line of defense in

food safety and help businesses adopt responsible sourcing policies and perform self-monitoring and risk assessment.

In 2016, NSYSU consolidate resources with the Kaohsiung Medical University Research Center for Environmental Medicine and co-founded the Rapid Screening Research Center for Toxicology and Biomedicine in order to develop fast and effective screening methods to test for food safety, drug abuse, environmental pollution, plasticizer contamination, and poisoning cases using ambient mass spectrometry. Over the past ten years, the amount of capital invested in patent licensing and industry-academia collaborations related to ambient mass spectrometry has exceeded NT\$80 million. The ambient mass spectrometry rapid screening technology developed by the core members of the research center has been licensed to Hon Hai Group's Yonlin Charity Foundation, which provided NT\$16 million toward the founding of Rapidsure Technology Corporation with NSYSU. The company's technical shares account for 49% of the total shares and belong to the Ministry of Science and Technology, NSYSU, and the inventors of the technology (core members of the Rapid Screening Research Center for Toxicology and Biomedicine). For more information on the research results, please see "[NSYSU Research Highlights](#)".

2. PM2.5 Aerosols

The NSYSU Aerosol Science Research Center is the only research center established specifically for the research of PM2.5 aerosols in Asia. In addition to committing to the scientific research of aerosols and to training and developing aerosol researchers, the research center also fulfills NSYSU's social responsibility and spares no effort in tackling this major issue. Since its establishment, the research center has promoted environmental awareness and popularized aerosol science in Taiwan, collaborating with the government to effectively control the generation and emissions of pollutants, provide a scientific basis for the formulation of new environmental protection policies, collaborate with local industries to adopt

innovative emissions-reducing technologies, and develop preventive healthcare measures against PM2.5 pollutants. These efforts will help us achieve our ultimate goal of cleaning up the environment and protecting public health, while also resolving the major issues of environmental protection and public health related to PM2.5 pollutants in Kaohsiung.

Since January 2019, the NSYSU Aerosol Science Research Center has tackled a variety of social issues in order to fulfill its responsibility as a public think tank and have a positive impact on society. The major achievements of the research center include: (1) Collaborations with local industries (e.g., China Steel Corporation, Taiwan International Ports Corporation, etc.) to achieve technological breakthroughs and resolve issues involving air pollution and PM2.5 pollutants; (2) Collaborations with the healthcare industry to investigate disease mechanisms linked to PM2.5 pollutants and conduct environmental air quality training for healthcare workers; (3) Organizing industrial forums to develop strategies to reduce PM2.5 emissions; (4) Collaborations with seed teachers to develop innovative teaching aids and materials; (5) Assisting the local government in establishing the Center for Air Pollution Prevention, Environmental Education, and Educational Resources and the Digital Center for Environmental Education; and (6) Promotion of aerosol science education in local communities to raise awareness of air quality and environmental protection among schoolchildren. For more information on the research results, please see "[NSYSU Research Highlights](#)".





3. Collaborations with Hospitals in Kaohsiung

NSYSU collaborates with local medical institutes on academic research. In 2019, the university collaborated with Kaohsiung Medical University on thirty-seven studies (including studies of pancreatic cancer, air pollution measurement, and Alzheimer's disease),

with Kaohsiung Chang Gung Memorial Hospital on twelve studies (including studies of skin cancer, liver cancer, asthma, and anticancer drugs), and with the Kaohsiung Veterans General Hospital on fourteen studies (including studies of melanomas, osteosarcomas, bone regeneration, and fully automated intelligent monitoring



systems). NSYSU is currently conducting a large-scale research project with six Kaohsiung municipal hospitals (Ta-Tung, Siao-Gang, Min-Sheng, Kai-Syuan, Feng-Shan, and United) involving real-time monitoring and the use of wearable sensing systems to detect environmental air pollution and measure changes airborne bacteria levels in hospital environments.

4. Developing a New Elder Care Model Involving Collaboration between Youth and Seniors

NSYSU promotes youth/senior collaborations through a broad array of approaches to social engagement, including:

- NSYSU co-learning programs
- The *Music in the Elder Care Design and Applications* course organized in tandem with Kaohsiung Veterans General Hospital
- Community health promotion courses developed by the Si Wan College Center for Physical and Health Education
- A senior lifestyle consisting of gardening, artistic, and other leisure activities proposed by the Department of Sociology

In a collaboration with the Guomao Community in Zuoying District, the Zuoying team of the Ministry of Science and Technology's Humanities Innovation and Social Engagement Program organized community empowerment and community theater projects and performed rolling research. Meanwhile, the Old Port team organized a community art intervention project focused on senior community members. These projects facilitated the development of public discussion models suitable for senior citizens.

(III) Culture Creation in Southern Taiwan

1. Promoting Community Heritage and Interdisciplinary Innovation in the Old Port and New Bay Communities

Due to years of urban development, a large part of Kaohsiung is facing a population outflow and industrial decline resulting from industrial transformation and changing urban activity. In 2019, NSYSU established the Social Engagement Center as a top-tier inter-collegiate organization to build on the existing foundation and continue the horizontal integration of the university's teams and resources and support NSYSU in promoting both heritage and innovation in the Old Port and New Bay Communities. The primary goal of the Social Engagement Center is to help these communities rediscover their developmental value and give them a future trajectory by carrying out projects in the arts and culture, education and esprit de corps, public participation, and industrial innovation. Projects have been implemented in the Yancheng, Cianjhen, Cijin, and Cishan Districts with the following achievements:

Yancheng District: The *Midsummer Night's Dream in Yanchengpu* community art event was organized to offer “an adventure of the five senses in the streets of Yanchengpu.” The event featured performing arts, installation art, and guided tours that showed Yanchengpu in a brand new light.

Cianjhen District: The *Collaborative Lesson Study Project for Local Schools in Caoya, Cianjhen* promoted educational development in Cianjhen District. NSYSU collaborated with local junior high and elementary schools to increase their educational resources through practical action. The *Community Time Bank* was set up in Lu-Jhong-Miao Community in Cianjhen District to promote community engagement and encourage community members to volunteer their skills and time in exchange for time credits, which can be used to cover the cost of services. The *Manual Laborers of Caoya, Cianjhen* special exhibition was organized by compiling local historical documents and interviewing local citizens; the exhibition promoted the value of labor in the local communities of Caoya, Cianjhen.

Cijin District: The *Food-Cherishing Kitchen Shared Economy* project was a collaboration between the NSYSU College of Social Sciences and the A-Fu Food

Bank. The Ugly Fruit Food Bank was established in Cijin District to secure food resources and share them with the community. An empowerment course was also given to new immigrants and a specialty restaurant was opened to help new immigrants put their skills to use.

Cishan District: The Cooperative Empowerment and Extension Service Team utilized the concept of cooperative empowerment and extension services (CEES) proposed by the NSYSU Institute of Public Affairs Management to bring together local administrative units, community development associations, and universities and colleges to develop a greater understanding of local needs, build local consensus, promote community empowerment, and solve problems in the participating communities.

2. Kaohsiung Studies: The Study of both Traditional and Modern Culture in Southern Taiwan

One major focus of NSYSU in 2019 was to establish Kaohsiung Studies from a grassroots perspective with the local communities. The most important aspects of this model were collaboration between the university and the communities and community empowerment. The NSYSU Social Engagement Center therefore brought together experts from various colleges and appointed the team behind the USR project *Participatory University Museum Partnerships* to develop a mechanism for NSYSU to establish partnerships with local communities and social engagement units to create urban exhibition venues that put cultural diversity on display. Through co-learning programs and non-traditional courses, NSYSU signed up local residents and community members to work with NSYSU students to identify their problems and needs and compile this information into a landscape, soundscape, and vision shared by these communities. The instructor groups in Kaohsiung Studies created co-learning programs and interdisciplinary courses in three major categories, inviting local organizations and communities to participate in and assist with the preservation of local skills and heritage.

In addition to organizing courses and workshops, we collaborated with various units through our local offices to organize cultural tours and community talent development events. We also collaborated with compulsory educational institutions to organize courses in local historical studies, thus allocating the university's resources to elementary schools and high schools in a flexible manner. Through these projects, we hope that every Kaohsiung citizen can tell their own story from their own perspective.

3. Building Expertise in Southeast Asian Languages, Cultures, and Business Markets

In response to the rapid economic growth of Southeast Asian countries and the government's New Southbound Policy, NSYSU organized three Southeast Asian language exchange events in 2019 to encourage international exchanges and enhance the participants' communication skills in Vietnamese, Thai, and Indonesian. NSYSU also established multiple conversational language courses and cross-cultural training courses to help NSYSU students seeking to travel abroad for academic exchanges or overseas studies. In 2019, NSYSU worked with the Taiwan External Trade Development Council to organize the international business talent development program, so as to develop talent with expertise in Southeast Asian languages, cultures, and business markets and fulfill the university's social responsibility.

The NSYSU College of Liberal Arts has invited both domestic and international scholars from a variety of different fields to host international forums, academic workshops (in Vietnam and Indonesia), and speeches on Southeast Asian culture. These exchanges helped us understand our differences and become more aware of the historical, cultural, and social connections and conflicts between Taiwan and these countries, and paved the way for future academic exchanges and cooperation.

To develop international talent, NSYSU follows a policy of increasing students' global mobility and helping them develop an international perspective, and has thus invited international art scholars from prestigious institutions to give seminars at NSYSU. The university encourages students to go abroad and interact with

international scholars and students, so as to gain a better understanding of global trends, integrate into the global community, and become more self-sufficient.

(IV) Boosting the Industrial Economy

1. Planning for an Environmentally Friendly Eco-Park at the Former CPC Refinery Site

In response to the environmental remediation of and follow-up planning for the China Petroleum Company (CPC) 5th refinery site in Nanzih, NSYSU has assisted with research on land and water remediation, cultural heritage, ecological landscape design, and renewable energy to aid the Kaohsiung metropolitan area in transforming into a sustainable city powered by renewable energy. In addition to CPC, NSYSU has also collaborated with China Steel Company, Taiwan Sugar Company, and Advanced Semiconductor Engineering (ASE Inc.) to develop key, cutting-edge industrial technologies and nurture talent in advanced materials and circular economic development.

2. Si Wan Industry/Academia Collaboration Club—Creating Added Value for Industry/Academia Collaborations

Founded by NSYSU in December 2014, the Si Wan Industry/Academia Collaboration Club currently has over a hundred members from the manufacturing, service, electronics, and technology industries. The club holds annual meetings to bring together businesses and NSYSU faculty and create mutually beneficial industry/academia partnerships. The club is linked with the Global Research and Industry Alliance, and members of either organization may join



the other organization, thus achieving mutual growth and benefits for both the industrial and academic sectors.

As part of the Ministry of Science and Technology's GLORIA project, NSYSU both founded and has successfully recruited fourteen industry members for the Global Research and Industry Alliance. The alliance has announced its commitment to the development of smart medical healthcare devices by combining resources from the public, clinic, industrial, academic, and institutional sectors, with the goal of developing talent and increasing Taiwan's international competitiveness.

3. Bringing Together Regional Academic and Research Resources to Further the Development of the Greater Kaohsiung Science Park

In addition to supporting the alliance of the public, industrial, and academic sectors in Central and Southern Taiwan, NSYSU has also established the Taiwan Academia-Industry Consortium of



Kaohsiung Software Technology Park, Taiwan Ocean Academia-Industry Consortium, and Southern Taiwan Industry Promotion Center of Kaohsiung Software Technology Park. By utilizing the combined R&D resources of the academic and institutional sectors to collaborate with businesses in technological R&D and talent development, these organizations have expanded the scale of and possibilities for industry-academia collaboration.

In response to the Executive Yuan's announcement of the launch of Ciaotou Science Park, NSYSU established Taiwan Ciaotou Science Park Academia-Industry Consortium to help bring in businesses from a variety of industries, including the

semiconductor, 5G, biomedical technology, aerospace, smart machinery, smart IoT, and startup software industries. The consortium focuses on connecting local industry clusters and transforming the science park into a site for experimental applications in emerging technologies, to create a technology corridor in this Silicon Valley of Southern Taiwan.

4. Promoting The Artificial Intelligence Industry and Academia Alliance

NSYSU has worked with the National Applied Research Laboratories to promote three major fields in the applied sciences: smart transportation, smart biomedicine, and smart machinery. NSYSU helps businesses in the science park identify problems and guides them towards the development of smart technologies.

NSYSU co-founded the Artificial Intelligence Research and Promotion Center with China Steel as a frontline research center. The research center consolidates the university's educational and research resources to further the use of artificial intelligence in research and provide the industrial sector with the technology it needs to lead the way in innovative technological research.

NSYSU has assisted ASE with the development of administrative and technological talents in the field of artificial intelligence by organizing training courses that offer lectures and hands-on training.

5. Campus Startup Incubation

NSYSU has provided incubation services to a total of 116 small and medium-sized businesses in Kaohsiung. The university has also provided guidance to 104 on-campus entrepreneur teams and subsidies totaling NT\$3 million to thirty-seven startup businesses founded by NSYSU faculty and students. As of 2019, businesses founded by NSYSU faculty and students account for 61% of all businesses incubated by NSYSU. The university has invested over NT\$150 million into business incubation and generated a total revenue of over NT\$300 million. NSYSU also aided businesses in acquiring over NT\$30 million in government funding for an experimental startup hub to help accelerate the development of startups. NSYSU also

established an angel investor firm (Si Wan Angel Investment Co., Ltd.), which has so far invested a total of approximately NT\$10 million in four startups founded by NSYSU faculty, students, and alumni.

6. Global Research and Industry Alliance

To connect the academic research and industrial sectors of Southern Taiwan with the international community, NSYSU co-founded the Global Research and Industry Alliance with Kaohsiung Medical University, National University of Kaohsiung, National Pingtung University of Science and Technology, and I-Shou University. The alliance is Taiwan's first and only interuniversity organization founded to promote the scientific research results of its members. Its primary focus is on smart medical devices, marine technology, advanced materials technology, and agricultural technology. The alliance supports innovative, interdisciplinary R&D collaborations, and works to create a globalized operating platform and ecosystem for industry-academia cooperation.

To promote industry-academia collaborations, the Global Research and Industry Alliance has signed a Memorandum of Understanding with the Netherlands' High



Tech Campus Eindhoven. The two parties formed this strategic partnership to encourage Taiwanese and Dutch investors to invest in the entrepreneurial teams of both High Tech Campus Eindhoven and the Global Research and Industry Alliance and thus establish a more comprehensive international ecosystem for the development of innovative technologies.

To accelerate the development of fast-growing startups and cutting-edge technologies with high investment value, NSYSU has signed a Memorandum of

Understanding with the Innovation BaseCamp of Gav-Yam Negev Advanced Technologies Park in Israel. In the future, this collaboration between NSYSU and Innovation BaseCamp will bring together businesses in Southern Taiwan and advanced technology research conducted in Israel. The partnership will also help members of the Global Research and Industry Alliance export cutting-edge technologies in fields such as marine technology, agricultural technology, artificial intelligence, medical technology, and high-value materials to meet the needs of the Israeli industries, thus driving the innovation and growth of the academic and industrial sectors of both countries.

(V) Providing Assistance in Local Governance

1. The Kaohsiung-Pingtung-Penghu Regional Technology Policy Group

Founded by NSYSU, the Kaohsiung-Pingtung-Penghu Regional Technology Policy Group conducts regular seminars to learn about the needs of local communities and establish cooperation through the disclosure of



current circumstances and policy implementation. These seminars help the group receive instant feedback so that the governance can implement measures accordingly. Six seminars were held between 2018 and 2019 and were attended by experts who gave speeches and led in-depth discussions to achieve the goals of policy outreach and local feedback collection.

2. The Think Tank of Southern Taiwan: Providing Assistance in Local Governance

The NSYSU College of Social Sciences has long committed itself to political, economic, educational, and sociological research into topics related to Southern Taiwan. The abundant research results obtained have helped the NSYSU College of

Social Sciences establish itself as an influential think tank in Southern Taiwan. The college's achievements in 2019 are as follows:

(1) Community Redevelopment

As a part of the trend of placemaking and revitalizing old communities, the faculty and students of the NSYSU College of Social Sciences have formed off-campus teams to collaborate with southern communities for local revitalization. The *Bay Shore Placemaking: Memory Representation and Innovative Transformation of the Transient Communities of Kaohsiung* project was launched last year. The project established design and placemaking outposts for transient communities of coastal Kaohsiung in Kaohsiung's Old Port Community, western Zuoying, and Caoya, Cianjhen, using placemaking to transform transient communities into successful examples of social innovation.

(2) Connection with the New Southbound Policy

Ever since its founding, the NSYSU Center for Southeast Asian Studies has actively promoted connections between Taiwan and Southeast Asian countries under the government's New Southbound Policy. The center has chosen the Philippines as a region for collaborative development and organized several events—including *Youth to the South: Davao Hackathon* and *Industry Cooperation and Talent Exchange Expo between Taiwan and the Philippines*—to help Taiwanese students learn about Southeast Asian industries and cultures and offer opportunities for internships and employment.

(3) Transportation Policy Development

The NSYSU College of Social Sciences' Research Center for Kaohsiung-Pingtung-Penghu Regional Transport Development has collaborated with the Directorate General of Highways, Ministry of Transportation and Communications to provide customized transportation services in rural areas. On June 1, 2019, four bus routes were launched and opened for reservations in Wutai, Pingtung to pick up local residents at their door steps and deliver them to their destinations. This shuttle service

has provided local senior citizens with greater convenience when making hospital visits, thus achieving transportation justice.

(4) Labor Policy Advocacy

Kaohsiung was Taiwan's center for heavy industry and has a large population of laborers. In recent years, the city has been actively pursuing urban transformation but still prioritizes the development of labor rights. To advocate for labor policies, the NSYSU College of Social Sciences' Labor Policy Research Office has held regular policy symposiums since its founding in the hope of bringing local labor policy in line with academic research and international perspectives. The office helps government agencies and organizations promote on-the-job training, safeguards labor rights and benefits, and facilitates domestic and international exchanges on labor issues.

(5) Encouraging Student Participation to Promote Public Issues in Local Communities

To quell public misgivings about disparities in higher education, the NSYSU College of Social Sciences encourages students to advocate for issues of importance to the public in local communities. Through practicum courses and field studies in our bachelor's program, we connect theoretical education with hands-on experience to inspire students to pursue entrepreneurship and social innovation, while also encouraging them to participate in placemaking projects.

3. Sustainable University Social Responsibility Interdisciplinary Collaboration Platform

The NSYSU College of Management's Institute of Public Affairs Management (IPAM) has long been committed to promoting regional governance and development of Kaohsiung, with NSYSU serving as a platform to coordinate resources in the public, industrial, academic, and institutional sectors and assist local communities with sustainable management.

In 2018 and 2019, IPAM implemented the *Ministry of Education University Social Responsibility Project* and the *Cishan District Office Placemaking Project* to great results, as detailed below:

(1) University Social Responsibility (USR) Project

NSYSU IPAM proposed the concept for the Cooperative Empowerment and Extension

Service (CEES), which encourages students to reach out to communities and help organize civic engagement programs and community workshops. By delving into local cultural contexts and getting a first-hand look at different geographical environments, students can identify local issues and needs and discover usable proposals and resources, allowing NSYSU to work closely and collaboratively with local communities.

● USR Course Development

With its main goals of local connections and youth development, NSYSU has organized professional courses that provide basic



hands-on training in order to nurture public participation on the part of our youth and encourage young people to engage in placemaking.

● Youth Participation in Community Initiatives

IPAM's public issue experiential education course has engaged with communities in Cishan District on a continuous basis since the 2018-2019 academic year. Two examples of this community engagement are the development of sightseeing tours and the integration of heritage preservation with industrial marketing in Da-Lin Community and the optimization of lychee-wood products for

added value in Nan-Sheng Community. Both have helped NSYSU fulfill its social responsibility.



● Civic Engagement Programs in Lu-Jhong-Miao Community, Cianjhen District

For a long time now, IPAM has attended closely to local governance issues in Kaohsiung and encouraged citizens to engage in public



participation. In 2018, in an extension of the Kaohsiung City Government's civic engagement program for Cianjhen District, IPAM helped promote public

participation and increase community cohesion by exploring lifestyle developments that were suited to the community and its members.



(2) Cishan District Office Placemaking Project

To help the Cishan District Office solicit local opinions and ideas, the IPAM team organized community workshops to encourage public participation and community consensus. After community members reached consensus and developed their placemaking vision, the team entered into discussions with the Cishan District Office and local businesses to help realize the community's placemaking proposals.



(VI) Internationalization (International Exchanges)

1. Enhanced Research Capabilities Signal NSYSU's International Influence

(1) Major International Contributions in Fields of Study in which NSYSU has a Competitive Edge

NSYSU has achieved exceptional results in international collaborative research efforts. In 2019, international co-authored papers accounted for 39.4% of the total number of papers published. NSYSU currently has a field-weighted citation impact (FWCI) of 1.24 for international co-authored publications, a sign of the outstanding quality of these papers. For more information on the research results, please see "[NSYSU Research Highlights](#)".

2. Talent Development

(1) Innovative International Teaching Model

◎Promoting International Shared Courses and Short-Term Training Programs:

NSYSU offers subsidies to encourage faculty to develop short-term training programs with sister universities overseas, so as to provide students with international training opportunities, strengthen collaborations between NSYSU and its sister universities, and motivate students to study abroad.

◎Promoting Co-Learning Programs for Innovative International Education: The instructors and students of two co-learning programs visited Japan and Vietnam to learn how to solve problems overseas with smart technologies while experiencing local folk religions through overseas field classes, local tours, urban cultural experiences, and workshops.

(2) Providing Students with International Exchange Opportunities

◎Encouraging Students to Study Abroad: Since the 2019 academic year, NSYSU has encouraged undergraduate students to complete all graduation requirements within three to three and a half years and to use the last six to twelve months of their studies to participate in international exchange programs for training or dual degrees. Each participating student is granted a scholarship with a monthly stipend of NT\$10,000. The new subsidy system also applies to Master's and doctoral students training at a university (or institution) overseas. Through these measures, NSYSU increases its students' international mobility.

©Improving Students' English Proficiency to Enhance International Mobility:

The NSYSU English Teaching Center has established an English proficiency training system for NSYSU students. In addition to English proficiency certification, the center has also organized a wide range of activities to motivate students and broaden their horizons.

© Providing Subsidies and Exchange Programs to Develop Talented Individuals with International Mobility: NSYSU encourages students to go abroad, explore the world, and broaden their horizons through a number of different channels: dual degree programs, exchange programs, short-term training programs, overseas field classes, practicums, internships, volunteer programs, competitions, and activities organized by non-governmental organizations or nonprofit organizations. 608 NSYSU students went abroad in 2017, 644 in 2018, and 575 in 2019 (seventy-nine students gave up their opportunities to participate in exchange programs due to the global political and economic climate and other factors). The numbers show the effectiveness of our incentives.

©Student Scholarships for Participation in International Events: In order to help NSYSU students become global citizens, broaden their horizons, and increase their international competitiveness, NSYSU offers student scholarships for participation in international events. In 2019, seventy students went abroad to participate in international events.

©Selecting Bachelor's Program Students to Participate in the University of California, San Diego's Summer Research Program: NSYSU offers a subsidy of NT\$100,000 to each student participating in UCSD's eight-week summer research program. In 2019, seven students were granted subsidies totaling NT\$700,000.

©Signing International Talent Development Agreements to Promote Collaboration: In recent years, NSYSU has prioritized the signing of substantive university-level agreements and has encouraged its colleges and departments to enter into agreements with international institutions. As of 2019, NSYSU has 252 international sister universities in forty-two countries around the globe. Of the 252

sister universities, 188 have signed student exchange agreements with NSYSU and over 80% of these have had substantial interactions via student exchanges.

(3) Recruiting International Students

©Establishing International Student Recruitment Goals and Strategies to Promote New Southbound Recruitment: In 2019, NSYSU was granted an overseas development and recruitment subsidy from the Ministry of Education's New Southbound Project. NSYSU has made use of the subsidy to recruit students from the Philippines and Sri Lanka, and shall continue to recruit international students from other Southeast Asian countries according to the school's annual plans. NSYSU also offers incentives to encourage outstanding international students to study at NSYSU. The university budgeted NT\$16 million in 2017, NT\$24.8 million in 2018, and NT\$27.62 million in 2019 toward incentives to attract more outstanding Southeast Asian scholars; since the summer semester of the 2018 academic year, it has also offered a full refund on tuition and miscellaneous fees for three-year programs for international doctoral students. In 2019, a total of 829 international students (626 degree students and 203 non-degree students) have studied at NSYSU, 619 of whom enrolled in our Chinese language program.

©Promoting Programs and Courses Taught in English: NSYSU currently has seven degree programs taught in English. Various NSYSU departments have also developed courses taught in English, with 334 courses launched in the 2016 academic year, 399 in the 2017 academic year, and 408 in the 2018 academic year, for an increase of 22% in the past three years.

© Building an Inclusive Campus for International Students and Providing them with Care and Counselling: The NSYSU Office of International Affairs is responsible for providing international students with counselling services and has always offered them the utmost care. The staff's efforts have been recognized by the Ministry of Education, which awarded NSYSU the title of Outstanding School in International Student Counselling in 2010, 2016, and 2019. NSYSU has created diverse and inclusive campus that is friendly to all cultures. For example, the school provides

Islamic prayer rooms and information about nearby Halal restaurants. The College of Engineering has also installed bidets in six restrooms inside the Building of Electrical Engineering for the cleansing needs of Muslim students.

3. Talent Recruitment

(1) Establishing a Comprehensive Talent Recruitment System to Increase Academic and Research Capacity



©Project to Bridge the Academic Generation Gap: In 2018, NSYSU established its Project to Bridge the Academic Generation Gap to circumvent limitations on the number of faculty members by prioritizing the recruitment of younger instructors and having them learn from senior faculty. Additional faculty compensation is paid for with school funds.

©Si Wan International Faculty Recruitment Project: In the 2017 academic year, in order to implement NSYSU's international faculty recruitment policy, NSYSU allowed each college to hire international contract instructors up to 10% of the number of full-time instructors. To accelerate the talent recruitment process and improve NSYSU's international teaching quality, NSYSU also gave deans the authority to provide outstanding academic and research personnel with a flexible monthly compensation of one to twenty times the base pay based on the contributions

they have made. As of 2019, NSYSU had employed thirty-seven international instructors; the school ultimately seeks to have international faculty account for 20% of the entire school faculty.

©**Si Wan Elite Scholar Recruitment Project:** NSYSU proactively seeks to bring exceptionally talented individuals in a variety of fields of study into the school to improve the university's international competitiveness. In the 2017 academic year, NSYSU hired eight Honorary Chair Professors, thirteen full-time international instructors, seventy-seven international short-term Visiting and Chair Professors, and nine international postdoctoral researchers. In the 2018 academic year, NSYSU hired twenty-one Honorary Chair Professors, eighteen full-time international instructors (including two Yushan young scholars), seventy international short-term Visiting and Chair Professors, and nine international postdoctoral researchers.

(2) New Faculty Guidance and Incentive Programs

©**Recruitment and Development of New Faculty:** To lighten the burden of teaching, NSYSU has stipulated that new full-time instructors will be given reduced teaching hours (reduced by three hours) in their first year and will be offered a flexible annual compensation of twelve to ninety-six times the base pay. NSYSU also developed its Academic Research Support system to provide new instructors with a higher percentage of subsidy funds, so as to attract outstanding talent, whether domestic or international. Additionally, NSYSU translated and printed its new faculty handbook in English to help international instructors learn about NSYSU policies and measures. New international faculty tea parties are also organized for NSYSU offices as a vehicle to communicate important issues to international instructors and help new international faculty familiarize themselves with the campus life at NSYSU.

© **Offering Incentives to Educators to Enhance Academic Capacity:** With the support of the Higher Education SPROUT Project, NSYSU offers various types of teaching incentives—including overseas educational training, teaching materials and curriculum development subsidies, rewards for courses taught in English, and

subsidies for innovative courses and digital courses—to enhance NSYSU’s international teaching quality.

(3) Creating an International Environment for Education and Research

NSYSU promotes its academic and research achievements through a variety of international channels to facilitate international academic exchanges and boost the university’s global exposure. NSYSU also hires staff members who are proficient in both Chinese and English to improve the contents of its English website, which is used to showcase the university’s major research achievements and events to demonstrate its capacity as a top university.

5. Social Responsibility

As a member of the global community, NSYSU strives to take action and conduct research that helps achieve the seventeen United Nations Sustainable Development Goals, so as to fulfill its global social responsibility. The NSYSU Office of Senior Vice President and the Social Engagement



Center are responsible for the global social responsibility at the university, while the various colleges and centers carry out tasks related to their respective fields of expertise. NSYSU’s major achievements in social responsibility and sustainable development are as follows:

(1) In February 2019, the NSYSU College of Marine Sciences established the Taiwan and Sri Lanka Environmental Change Sciences and Technology Innovation Center with the University of Sri Jayewardenepura (USJP) in Sri Lanka. For more information, please see [”NSYSU Research Highlights”](#).



The NSYSU College of Management established the Office of Responsibility and Sustainability Actions (ORSA) to jumpstart international sustainable development activities within the college. Additionally, the Office of International Affairs works with other NSYSU colleges to create an outstanding sustainable globalized educational environment. This includes the implementation of the International Volunteer and Service Learning Program for the Establishment of a Place for Social Engagement, the International Social Responsibility Program for the Establishment of an Inclusive Living Environment, and the International Internship Program to Boost NSYSU's Social Responsibility. NSYSU's international outreach efforts have found their way to the United States, the Solomon Islands, Canada, France, Germany, Austria, Albania, Uruguay, Russia, China, Japan, and Mexico.



IV. Major International Collaborations

(I) Marine Sciences

1. Collaboration with Sri Lanka



(1) The Taiwan and Sri Lanka Environmental Change Sciences and Technology Innovation Center: NSYSU collaborated with Sri Lanka's University of Sri Jayewardenepura (USJP) to establish the Taiwan and Sri Lanka Environmental Change Sciences and Technology Innovation Center in February, 2019. NSYSU also



collaborated with the University of Ruhuna to establish a marine research station. For more information, please see “[2018-2019 Annual Report](#)” (Media coverage: <https://reurl.cc/b688GE>)

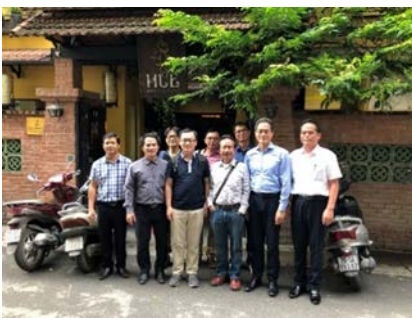
2. Overseas Research at the Center for Integrated Underwater Observation Technology

An overseas research team formed by Professor Hsin-Hung Chen and Associate Professor Yu-Cheng Chou of the NSYSU Institute of Undersea Technology visited the Center for Integrated Underwater Observation Technology at the University of Tokyo's Institute of Industrial Science and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). This short-term overseas study of undersea technology yielded great results and successfully established a communication channel between NSYSU and the Institute of Industrial Science, which will have a beneficial effect on future academic collaborations. For more information on the study, please see “[NSYSU Research Highlights](#)”.



3. Short Visit to Vietnam for Academic Exchange

Dr. Hsien Hua Lee, Dean of the NSYSU College of Marine Sciences, led a delegation to the Science and Technology Division of the Taipei Economic and Cultural Office in Vietnam, the Institute of Marine Environment and Resources (IMER) of the Vietnam Academy of Science and Technology (VAST), and the Hanoi National University of Education. The visit expanded the possibilities for student recruitment and research as the faculty and students of both universities showed great interest in collaborating with the NSYSU College of Marine Sciences and studying in Taiwan. The delegation also plan to sign a Memorandum of Understanding with VAST IMER and to establish the Taiwan-Vietnam Center for Marine Research to facilitate academic exchanges.



4. Academic Exchange with University of California San Diego

The Scripps Institution of Oceanography at the University of California San Diego (UCSD) is one of the world's leading institutes in the field of marine sciences



and is held in high esteem by NSYSU. NSYSU actively organizes bilateral research symposia with UCSD to collaborate with and visit the latter's research facilities in marine chemistry and marine biology to study their research achievements. To strengthen academic collaboration between NSYSU and UCSD, three faculty members from the NSYSU Department of Oceanography have visited UCSD to learn from experts in their respective fields of study.

5. Short Visit to Japan for Academic Exchange

Professor Chih-Chuang Liaw of the NSYSU Department of Marine Biotechnology and Resources visited Nihon Pharmaceutical University's Department of Pharmaceutical Sciences and signed a Memorandum of Understanding regarding educational and research collaborations between the two parties, which has created opportunities for future academic collaborations in drug development research.



NSYSU representatives also visited another top-tier college—Hokkaido University's School of Fisheries Sciences—and invited its expert in natural marine products, Professor Ryuichi Sakai, to visit NSYSU. The two universities have established a bilateral mechanism to facilitate inter-university student visits and academic exchanges.



(II) Aerosols

Because they are a worldwide threat to both the environment and human health, air pollution and PM_{2.5} aerosol particles have become major global issues. The NSYSU Aerosol Science Research Center (ASRC) was established in 2017 as the only research center specifically dedicated to research on PM_{2.5} aerosols in Asia, giving it major significance both in the region and globally. The ASRC and its standing committee, the International Advisory Committee, were established to conduct research into a major area of concern for NSYSU. The ASRC is committed to developing cutting edge technologies and conducting research in aerosol science. The center also actively pursues academic exchanges and opportunities to collaborate with authoritative academic institutions and figures around the world, making it an important participant in the global effort to mitigate the impact of air pollution and PM_{2.5} pollutants on the environment, climate change, and human health. Associate Professor Chia-Chen Wang, Director of NSYSU ASRC, developed high-resolution aerosol photoelectron spectroscopy technology and time-resolved Fourier transform infrared spectroscopy technology, both of which have received international recognition and appreciation. Since 2019, Professor Wang has been invited to share her latest research achievements at international symposia and authoritative academic research institutions around the world. The aerosol research teams from the German Electron Synchrotron (Deutsches Elektronen-Synchrotron; DESY) and the Karlsruhe Institute of Technology (KIT) have invited Professor Wang to visit their facilities for academic exchange and to give academic talks. The NSYSU aerosol research team has also been invited to participate in international collaborations with these institutions starting in 2020. Professor Wang was also invited to Switzerland and Japan to share NSYSU's latest research achievements in aerosol dynamics and spectroscopy, helping the university gain global exposure and influence in the field of aerosol science. NSYSU's major international achievements in aerosol science are

listed below. For more research information, please see "NSYSU Research Highlights".

1. Organizing the 1st International Symposium on Aerosols Characterization and Therapies
2. The only aerosol research academic agreement between Asian and North American universities—international research collaboration between NSYSU ASRC and UCSD on PM_{2.5} particles
3. ASRC faculty and students visited UCSD to participate in a bilateral research symposium and major summer research program on aerosol science.



4. NSYSU welcomed international guests and scholars visiting the ASRC to create new collaboration opportunities.



(III) Photonics and Communications

1. NSYSU has collaborated with the UCSD Center for Integrated Access Networks (CIAN) since 2013 and signed a Memorandum of Understanding with the UCSD Department of Electrical and Computer Engineering in 2017 for the regular



organization of bilateral research symposia and NSYSU-UCSD summer research programs. The two universities also share two laboratories in order to maximize resource efficiency.

2. In March 2019, an NSYSU delegate made a visit to UCSD to attend a bilateral research symposium. Assistant Professor Chun-Ta Wang of the NSYSU Department of Photonics conducted overseas research during summer vacation in collaboration with the laboratory headed by Professor Yeshaiahu Fainman and Professor Paul K. Yu. Yu-Tung Hsiao, an NSYSU undergraduate student, participated in the UCSD summer research program, while doctoral student Duan-Yi Guo visited UCSD as a visiting graduate student.

3. The department has had many outstanding research achievements in the areas of silicon photonics and optical communication—including the development of highly nonlinear tantalum pentoxide materials, low-loss high-confinement waveguides, high-speed optoelectronic devices, monocrystalline photonic crystal structures, and heterogeneous coupling solutions via wafer bonding—that have achieved breakthroughs in the functionality, bandwidth, and efficiency of current optoelectronic devices. NSYSU's silicon photonics team works closely with the Belgian Interuniversity Microelectronics Center (IMEC), the world's largest institute for microelectronics research and development, on large integrated projects for the Ministry of Science and Technology. Recently, the team has also signed a

Memorandum of Understanding with the Japanese National Institute of Advanced Industrial Science and Technology (AIST)'s silicon photonics research department to jointly develop functional hybrid silicon photonic devices, with NSYSU responsible for design, layout, and measurement while AIST handles manufacturing. The team's achievements have been published in several top international journals, including Nature Communications, Nature Photonics, and Physical Review Letters (PRL). In recent years, the team has generated over NT\$10 million in revenue through industry-academia collaborations and technology transfers with LandMark Optoelectronics, Hon Hai, and Taiwan Semiconductor Manufacturing Company. The team aims to become a major hub that attracts international experts in the design and development of silicon photonics to Taiwan. The NSYSU photonics team has also established a close partnership with Ghent University in Belgium. The two universities have published a large number of joint papers in high-ranking journals such as Applied Physics Letters and Optics Letters.

(IV) College of Management / Business Management

1. Participation in International Organizations Gains Exposure and Expands International Collaboration

Since 2016, the NSYSU College of Management has adopted a policy of internationalization and actively participated in international organizations. Our efforts in the past four years have led to a number of achievements.



For example, the college participated in conferences held by French-based higher education ranking institution Eduniversal and, after three years of continuous effort, was promoted from the 3 Palmes league (listed in 2008) to the 4 Palmes league in 2019. (Media coverage: <https://udn.com/news/story/7323/4136692>)

NSYSU also participates in other rankings published by international organizations. For example, we are the only Taiwanese university to hold a spot in the top 100 of the Financial Times' Executive MBA rankings since 2014. (<https://udn.com/news/story/7266/3422350>). We are also the only Taiwanese university to be included in the Financial Times MBA rankings since 2016 (<http://www.cm.nsysu.edu.tw/p/406-1024-217192,r3671.php?Lang=zh-tw>). In 2018, the NSYSU College of Management was ranked 23rd in the Master's in Finance table of the Times Higher Education/Wall Street Journal business school report, making NSYSU the only Asian university listed (<http://news.nsysu.edu.tw/p/16-1120-196263.php?Lang=zh-tw>).

The NSYSU College of Management sends its administrators to attend conferences held by business and management associations, and has become an accredited member of the Association to Advance Collegiate Schools of Business (AACSB), making NSYSU the first national university in Taiwan to receive AACSB accreditation. The college is a member of the European Foundation for Management Development (EFMD) and has applied for EQUIS accreditation; we also participate in the conferences held by international university ranking institution Eduniversal, the Association of Asia-Pacific Business Schools (AAPBS), and the Pacific Asian Consortium for International Business Education and Research (PACIBER). By attending such organizations and conferences, we have been able to participate in academic exchange with outstanding business schools around the world, help NSYSU gain international exposure, and seize opportunities for international collaboration.

2. An International Faculty and Courses Taught in English

(1) International Faculty

The college is committed to establishing an all-English teaching environment and has organized about seventy courses taught in English every academic year. Eleven international faculty members from nine different countries were employed by the college in the fall semester of the 2019 academic year.

(2) International Visiting Business Scholars

The college budgets NT\$1.5 million annually to support invitations to distinguished international scholars whose works have been published in top journals to visit NSYSU as visiting scholars. Around eighteen visiting scholars stay at NSYSU for over a week each year.

Academic year	2011	2012	2013	2014	2015	2016	2017	2018
Number of scholars	19	22	20	15	18	18	15	18

(3) Courses Taught in English

Over seventy English language courses (mostly lecture courses) are taught at the college each academic year. The college has also increased the number of courses taught in English for exchange students (five in the 2017 academic year; ten in the 2018 academic year; five in the fall semester of the 2019 academic year).

Academic year	2013	2014	2015	2016	2017	2018
Number of courses	53	49	59	73	77	76

(4) Overseas Courses

In the 2018 and 2019 academic years, the college has offered two overseas courses (EMBA) at universities in Mainland China and Japan and three courses (Institute of Public Affairs Management, International Business MBA, and *Business Administration I*) that included visits to Hong Kong, Japan, Mainland China, and Vietnam.

(5) Number of NSYSU CM Students Going Abroad and International Students Visiting NSYSU CM

Academic year	NSYSU CM to International institution	International institution to NSYSU CM	Mainland Chinese institution to NSYSU CM
2013	102	242 (including 101 fee-paying exchange students in special programs)	63
2014	127	324 (including 214 fee-paying exchange students in special programs)	69
2015	156	282 (including 154 fee-paying exchange students in special programs)	123(including 41 fee-paying exchange students in special programs)
2016	134	400 (including 285 fee-paying exchange students in special programs)	91(including 32 fee-paying exchange students in special programs)
2017	182	137	53
2018	210	114	58

A. A total of 202 overseas students pursued an NSYSU degree (registered students, including those pursuing dual degrees) in the 2018 academic year.

Academic year	International students			Overseas Chinese students			Mainland Chinese students			Sub-total
	Bachelor	Master	Doctoral	Bachelor	Master	Doctoral	Bachelor	Master	Doctoral	
2014	15	61	6	34	12	1	1	14	5	149
2015	10	46	4	16	5	0	2	9	6	98
2016	15	73	5	40	11	1	3	9	5	162
2017	10	94	15	41	12	1	3	11	5	192
2018	7	89	21	44	13	1	4	17	6	202

