



NKUST

National Kaohsiung University of
Science and Technology

SUSTAINABILITY REPORT



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About this Report

In response to the UN Sustainable Development Goals (below, the SDGs), National Kaohsiung University of Science and Technology (NKUST) issues this Sustainability Report (the Report) in December, 2022. Through this Report, NKUST discloses our performance in terms of teaching, research, environmental protection, social participation and governance, providing a reference for all stakeholders.

◆ Reporting Framework

This Report adopts the reporting tools of the Sustainability Tracking, Assessment & Rating System (STARS), developed by the Association for Advancement of Sustainability in Higher Education (AASHE), as our main reporting framework. This Report also discloses NKUST's sustainability achievements in terms of environmental, social and governance (ESG) principles.

◆ Reporting Period

The data and content disclosed in this Report primarily cover the time period from January 1 to December 31, 2021. In terms of the academic year, the scope covers the 2020 academic year (from August 1, 2020 to June 30, 2021). For completeness, some data also includes information from before 2021 and the latest information as of 2022.

◆ Boundary and Scope

The scope of information detailed in this Report covers NKUST. A portion of the performance information covers NKUST-affiliated institutions.

◆ Basis for Calculations

All information and statistical data in this Report have been collected and compiled by NKUST. The financial data is expressed in New Taiwan Dollars (NTD). Our statistical data is collected, measured and calculated in line with regulatory requirements. Where no specific regulations apply, international standards are referred to instead.

◆ Sustainability Performance Assurance

A portion of the information in this Report has been given limited assurance by PwC Taiwan, in accordance with ISAE3000 (International Standard on Assurance Engagements 3000) issued by International Auditing and Assurance Standards Board (IAASB). The assurance report is included in this Report's Appendixes.

◆ Publication

This Report was published for the first time in December, 2021, and will in the future be published once a year. It is available for viewing and download from the NKUST website.

Publication date of the current edition: December, 2022

Publication date of previous edition: December, 2021



Feedback

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A Word from the President

As far as NKUST is concerned, 2022 is “the Year of Sustainability.”

In December this year, NKUST was honored with a National Sustainable Development Award from the Executive Yuan. Additionally, the first edition of NKUST’s Sustainability Report won a Silver Award in the Sustainability Report category of the Taiwan Sustainability Action Awards (TSAA). The 2022-2025 Mid-Term University Affairs Development Project, which began implementation this year, upholds the founding spirit of the three universities that merged to become NKUST. The Project integrates three major characteristics: Strong Industry Connections; Innovation and Entrepreneurship; and Marine Technology. NKUST has also officially incorporated Social Concern into our university affairs development. NKUST is dedicated to using our positive influence, alongside our educational partners, to respond to the challenges brought on an aging society. As we stand with industry and local communities in facing global competition, we resolve never to forget what it means to be an educational institution, striving to cultivate talents who will create the future for Taiwan.

NKUST has always played the role of a practitioner and promoter of sustainability, through cultivating professional talents, improving access to higher education, fostering cross-disciplinary industry-academia collaboration, and R&D and expansion of software and hardware. Through our long investment in and sustainable development of the university’s construction and technological sharing, we enjoy concrete achievements in reducing carbon emissions and elevating efficiency in smart campus governance. We are also taking strong steps forward in terms of abstract financial management, campus equality, class mobility, and so on. Moreover, NKUST is eliminating barriers between the university and society in pollution control, industry transformation, and cultural production for local communities. We are infinitely extending our channels for learning, services and sharing.

This Sustainability Report shows that NKUST has extended and strengthened our determination to become a carbon-neutral university. In addition to promoting NKUST’s philosophy of sustainable development and creating deep connections between teaching with research, we have done our best to share the university’s power and resources with local communities and our partners from all walks of life. We are seeking out new opportunities and actions, such as fostering self-understanding and improvement through carbon inventories, probing into technological implementation of blue and green carbon, encouraging R&D for cross-disciplinary circular economy technologies, and expanding sharing of industry-academia-research resources and international cooperation. We continue to work with the wider world to open up paths to sustainability.

This *2021 Sustainability Report* shares this year’s financial affairs, teaching, research, social responsibility, international exchange, and other performance and progress with NKUST’s stakeholders. Suggestions and advice from society are the seeds from which NKUST’s new ways of thinking and practical strengths grow. They give us the momentum to accelerate our exploration of future paths, enabling NKUST to continue moving forward with the rest of the world on the road to sustainability.



Major Education Performance Highlights for 2021

2021 Taiwan Sustainability Action Awards (TSAA)

Won a TSAA **Gold Award** for the "Building a Nest in Yanchao" Project for Innovative Agriculture (SDG 4)
Won a TSAA **Bronze Award** for the "Good Fish Next Door" Project (SDG 12)

2021 Taiwan Corporate Sustainability Awards (TCSA)

Won a **Bronze Award** in the Sustainability Report Category.

Global Views Monthly

In 2021, NKUST ranked **5th** in the Best Taiwan Universities Ranking: Technological and Vocational Category organized by Global Views Monthly.

For two consecutive years in 2020 and 2021, our "Building a Nest in Yanchao" Project for Innovative Agriculture won a **Model Award** in the *Global Views Monthly* University Social Responsibility (USR) Awards Industrial Co-creation Category.

Survey conducted by CommonWealth Magazine

Placed **fourth** in the 2021 *CommonWealth Magazine* USR University Citizen Survey Public Technical and Vocational Colleges category. NKUST scored 3.6 points (out of 5) in Social Participation, and got the highest score in the category for Environmental Sustainability.

1111 Job Bank's 2021 Survey of Enterprises' Favorite Universities

Ranked **3rd** among Public Colleges and Universities of Science and Technology in the Overall Employer University Satisfaction Ranking.

Sustainability Honors and Awards



Outstanding Achievements

World's Top 2% Scientists 2020

In 2021, **45** teachers of NKUST were listed among the World's Top 2% Scientists 2020, placing NKUST the 11th among Taiwan's national colleges and universities, and the **2nd** among Taiwan's universities of science and technology.

30th edition of the Times Young Creative Awards

Won the annual Best School Young Creative Awards in the University category. The Department of Cultural and Creative Industries won **9** awards, including 2 Golden and 1 Silver Awards, 2 Champions, 2 Runner-ups, 1 Third Place, 5 Excellence Awards, and the Online Favorite Award.

College student research projects approved by the Ministry of Science and Technology

In the 2021 academic year, **59** research projects were approved, ranking NKUST the **1st** among all national universities of science and technology, and ranking the 9th among Taiwan's national colleges and universities.

1

CHAPTER

Sustainable Governance

1.1

School History

1.2

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1.3

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1.4

Diversified Governance

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1.6

Stakeholder Engagement

1.1 School History

1.1.1 Brief History of NKUST

National Kaohsiung University of Science and Technology (hereinafter referred to as NKUST) was established on February 1, 2018, through the merger of National Kaohsiung Marine University, National Kaohsiung University of Applied Sciences, and National Kaohsiung First University of Science and Technology in response to the “Merger Plans of Taiwan Universities and Colleges,” implemented by the educational policy of Taiwan’s government. NKUST’s history began in 1946 when the first of the three universities, National Kaohsiung Marine University, formerly known as the Taiwan Provincial Keelung Fishery Vocational High School Kaohsiung Campus, was established over 75 years ago. With the meticulous planning of past presidents, and the many years of endeavors by NKUST’s teachers and students, NKUST keeps growing, having become a top university with new features and global vision.

1.1.2 Future Prospects

NKUST possesses the advantages of humble school tradition, diverse departments, excellent teaching and research, and the outstanding performance of its alumni, making it a vital and lively organism. In the future, NKUST hopes to elaborate and multiply these advantages to cultivate more outstanding technical and vocational talents, and to promote industrial and business development in Southern Taiwan. Additionally, NKUST will play the role of a trend navigator for society, the nation and for sustainable development around the world. With the school spirit of “co-creation of human-centered value,” NKUST aims at the goal of GREAT, namely “Globalization,” “Responsibility,” “Enhancement,” “Alignment,” and “Trend” to create an exemplary university that is highly approved by the international society, and that cultivates industrial development talents in international technical and vocational education.

1.1.3 School Features

NKUST integrates the following four strengths: strong connections with industries, innovation and entrepreneurship, ocean technology, and social concern, while being dedicated to upholding the founding spirit of the original three universities. Additionally, NKUST highly values the goal of global sustainable development along with its four features. NKUST connects regional industries in the field of electrical engineering to possess profound industrial foundation to present the feature of “strong connections with industries.” In response to the global trend, NKUST actively promotes the education of four creations, smart commerce, and cross-disciplinary hands-on programs. NKUST places importance on the innovation, practical skills, cross-disciplinary abilities, and employability of students to show the feature of “innovation and entrepreneurship.” Moreover, NKUST possesses the most complete departments related to ocean technology and has thoroughly built the foundation of industry-academia research and development of ocean technology. NKUST is the only one technical and vocational university that cultivates marine professionals in Taiwan, so it has the feature of “ocean technology.” Furthermore, NKUST shoulders the global sustainable development responsibility of a citizen of the world, and actively incorporates it into the university’s development plan. This is the feature of “social concern” that the university presents.



1.1.4 Campuses and Services

NKUST has five campuses, including Jiangong Campus, Yanchao Campus, the First Campus, Nanzih Campus, and Cijin Campus. These campuses are respectively located in Sanmin District, Yanchao District, Nanzih District, and Cijin District, providing students with excellent and diverse learning environments. Each year, over 7,000 students graduating from NKUST enter the workforce.

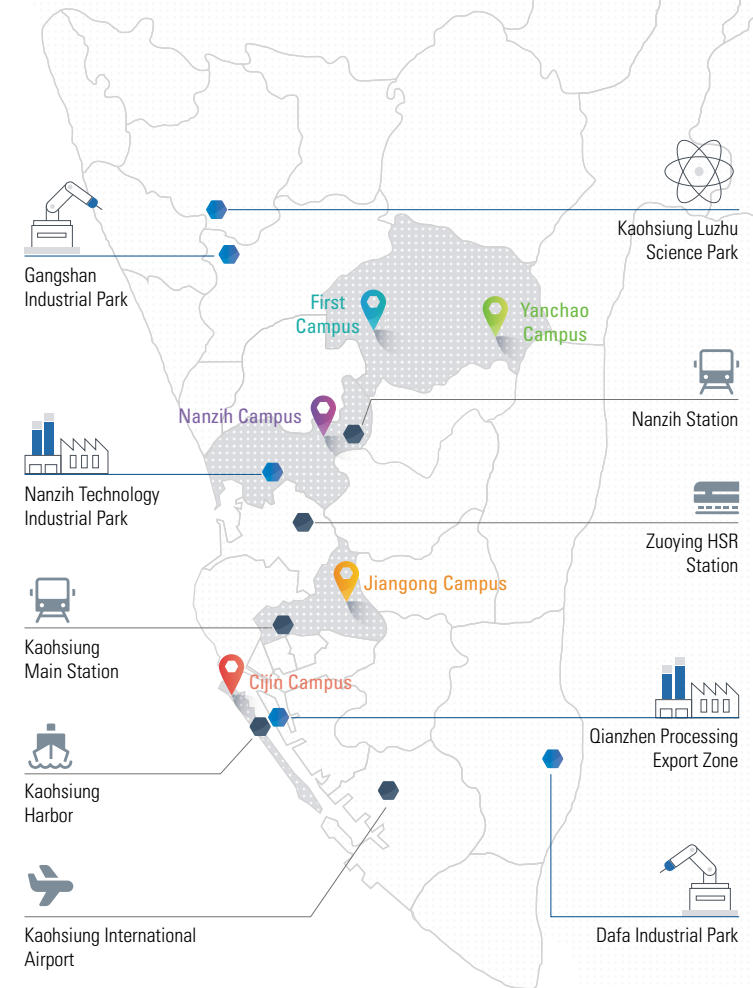
NKUST offers daytime five-year junior college programs, two-year technical programs, four-year technical programs, graduate programs and Ph.D. programs, two-year and four-year technical programs of the Division of Continuing Education, in-serve graduate program, the two-year technical program of the Affiliated Institute of Continuing Education (being transformed into the two-year technical program of the Division of Continuing Education on weekends and holidays in the 2023 academic year), and other numerous degree programs for a great number of students. Meanwhile, NKUST welcomes junior high, senior high, and vocational high schools to visit the university and to exchange opinions. From 2021 to July 2022, a total of 1,922 students of senior high and vocational high schools toured the university. Additionally, NKUST held an exchange forum for the five-year junior college program and invited junior high school teachers to interact with the departments of the five-year junior college program at NKUST. In 2022, NKUST invited teachers from 22 junior high schools to visit the university.

Locations and features of NKUST's Five Campuses

Nanzih Campus	Cijin Campus	Jiangong Campus	Yanchao Campus	First Campus
				
Nanzih District, Kaohsiung City	Cijin District, Kaohsiung City	Sanmin District, Kaohsiung City	Yanchao District, Kaohsiung City	The border of Yanchao District, Nanzih District and Qiaotou District, Kaohsiung City
Nanzih Campus is adjacent to Kaohsiung Nanzih Technology Industrial Park and MRT Houjin Station in Kaohsiung and enjoys convenient transportation systems. The College of Hydrosphere Science, the College of Maritime, the College of Marine Commerce, the College of Electrical Engineering and Computer Science, and the College of General Education are on Nanzih Campus.	Cijin Campus is connected to Kaohsiung Harbor, and NKUST is the only university in Taiwan that has an exclusive wharf. The campus is a key school district that offers maritime education and training in Southern Taiwan. The College of Maritime is on Cijin Campus.	The life function of Jiangong Campus is convenient. The College of Engineering, the College of Electrical Engineering and Computer Science, and the College of Management are on Jiangong Campus. Additionally, as the campus enjoys convenient transportation systems, and the development of its continuing and extension education is complete, it is closely connected to the community.	The entire Yanchao Campus is on the hilly land with Shenshui River running through it. With mountains on one side and waters on the other, the campus enjoys beautiful scenery. School buildings on Yanchao Campus are sparsely distributed, and it is the model of an ecological campus. The College of Humanities and Social Sciences, Business Intelligence School, and the College of Management are on Yanchao Campus.	Divided by Sun Yat-sen Freeway (also known as National Highway No. 1), First Campus has the East and West Campuses. The East Campus is the academic and administrative area, while the West Campus serves as the exercise and leisure area. A university bridge has been built to connect the two campuses. First Campus enjoys a spacious area, and beautiful scenery. The College of Engineering, the College of Electrical Engineering and Computer Science, the College of Management, the College of Finance and Banking, the College of Foreign Languages, and Center for Innovation and Entrepreneurship Education are on the First Campus.

1.2 University Data

Campus Map





Total area of NKUST

2,160,615.84 square meters

Average university area
per student

75.58 square meters



Total floor area

608,563.98 square meters

Average floor area
per student

21.29 square meters

Floor area for health care space¹

537.62 square meters

Floor area for intensive energy use
venues²

43,339.94 square meters

Number of
colleges³

12



Number of
departments and
graduate institutes⁴

53



Number of
independent graduate
institutes⁵

3



Number of university-
level research
centers

20



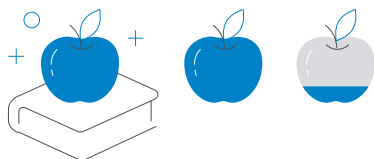
Number of college-
level research
centers

33



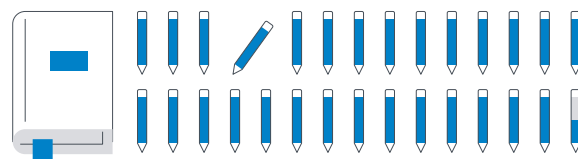
Total number of faculty and staff & FTE⁶

2,378



Total number of students⁷

28,589



Number and distribution of sister colleges

453 sister colleges in total.



Number of cooperation alliances with foreign universities: **6**

- ◆ Réseau Figure
- ◆ Taiwan-Japan Alliance of Local Revitalization and Social Practice
- ◆ Polytech Group France
- ◆ Cross-strait University Alliance for Innovation and Entrepreneurship
- ◆ ST9 & E9
- ◆ HAWtech-TAltech

Number of contracts
with school-level
sister colleges⁸

499

Number of contracts for
international student
exchange programs⁹

175



1. Including Health Care Division, Medical Room, Health Education Room, Observation Room, Health Center, and Nursery Room.
2. Library and Information Building on Yanchao Campus, and Library and Information Center on the First Campus included.
3. The number of colleges, departments, graduate institutes, and independent graduate institutes is the latest data as of August 1, 2022. The number of colleges does not include Center for Innovation and Entrepreneurship Education, and cross-college degree programs.
4. Excluding independent graduate institutes, PhD programs, in-service graduate programs, and degree programs.
5. Graduate Institute of Photonics Engineering, Graduate Institute of Maritime Affairs and Business Management, and Graduate Institute of Science and Technology Law.

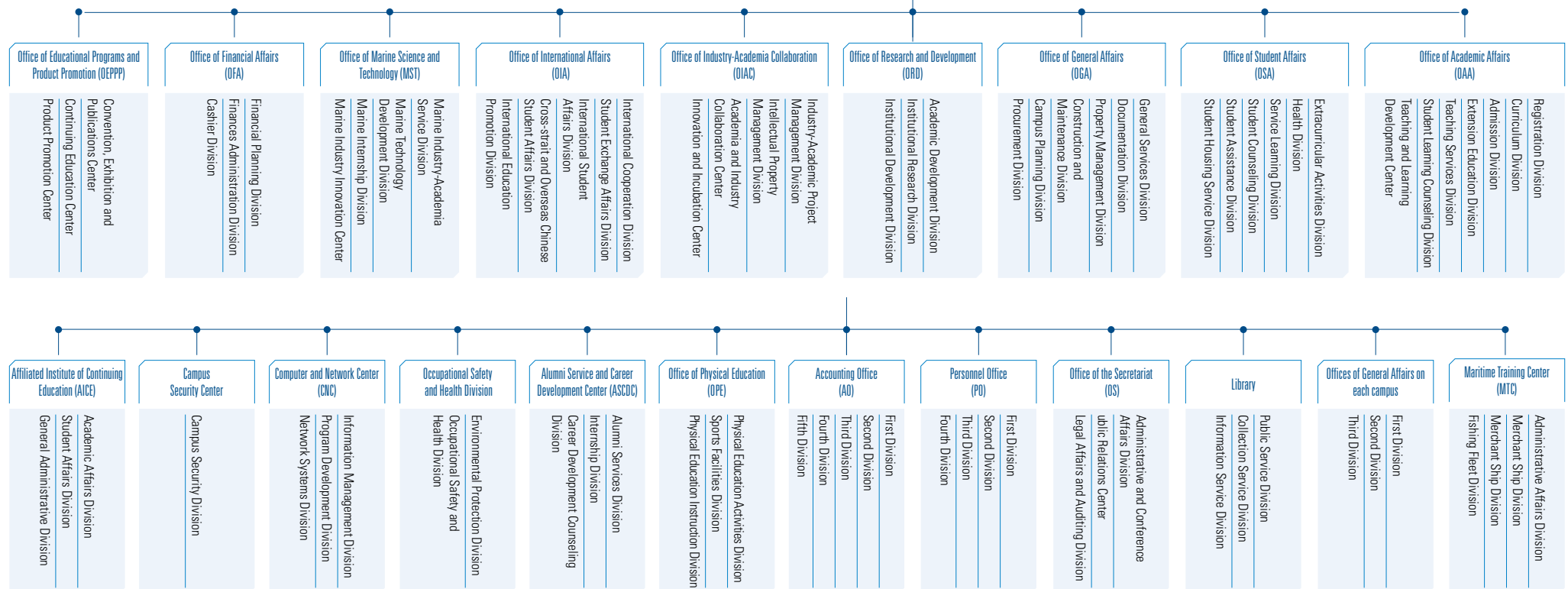
6. Including full-time faculty, adjunct faculty (0.2 FTE), permanent staff, School Funds Management Committee personnel, project personnel, and project researchers.
7. Including PhD programs, graduate programs, the four-year technical program, the two-year technical program, the five-year junior college, and in-service graduate programs.
8. The number of valid contracts as of the end of 2021.
9. NKUST signed the contract for international student exchange programs with 175 sister colleges as of the end of 2021.

1.3 Organizational Structure

The organizational structures of administrative and academic divisions at NKUST operate in accordance with “the Rules of Organization” passed in the 4th University Affairs Meeting in the 2021 academic year on June 15, 2022. The organizational overviews¹⁰ are as follows:

- Organizational overview of administrative divisions: There are a total of 26 administrative divisions, and the Affiliated Institute of Continuing Education as shown in the following Figure. Additionally, NKUST will add Office of Sustainable Development, and Management Office in February 2023. Office of Sustainable Development includes Sustainable University Office, and University Affairs Big Data Analysis Center to help NKUST move forwards on the road of sustainability.

Organizational structure of administrative divisions



10. The term of office for the meeting participants of important decision-making meetings is from August 1, 2021 to July 31, 2022.

- ◆ Organizational overview of academic divisions: There are a total of 12 colleges, 1 level-one academic unit, and 1 cross-college degree program as shown in the following Figure.

☑ Organizational structure of academic divisions

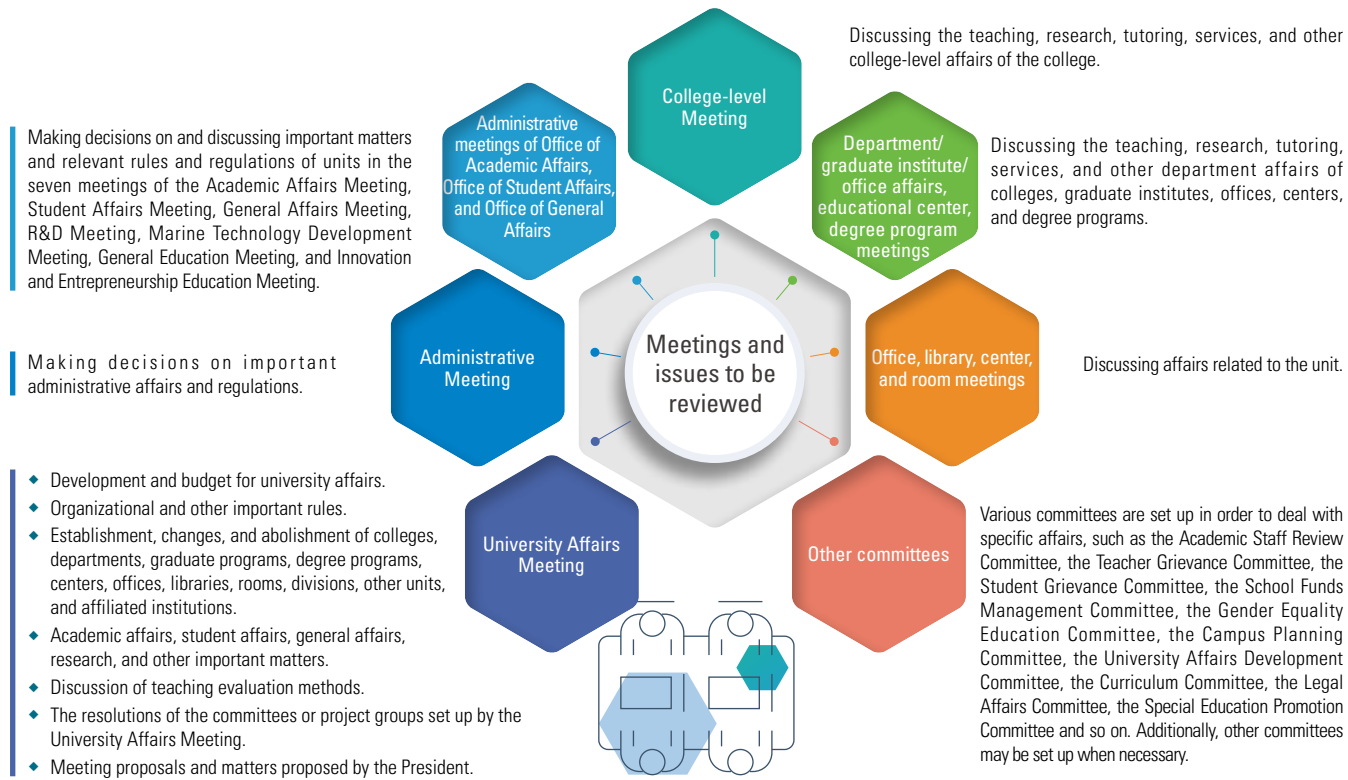


1.4 Diversified Governance

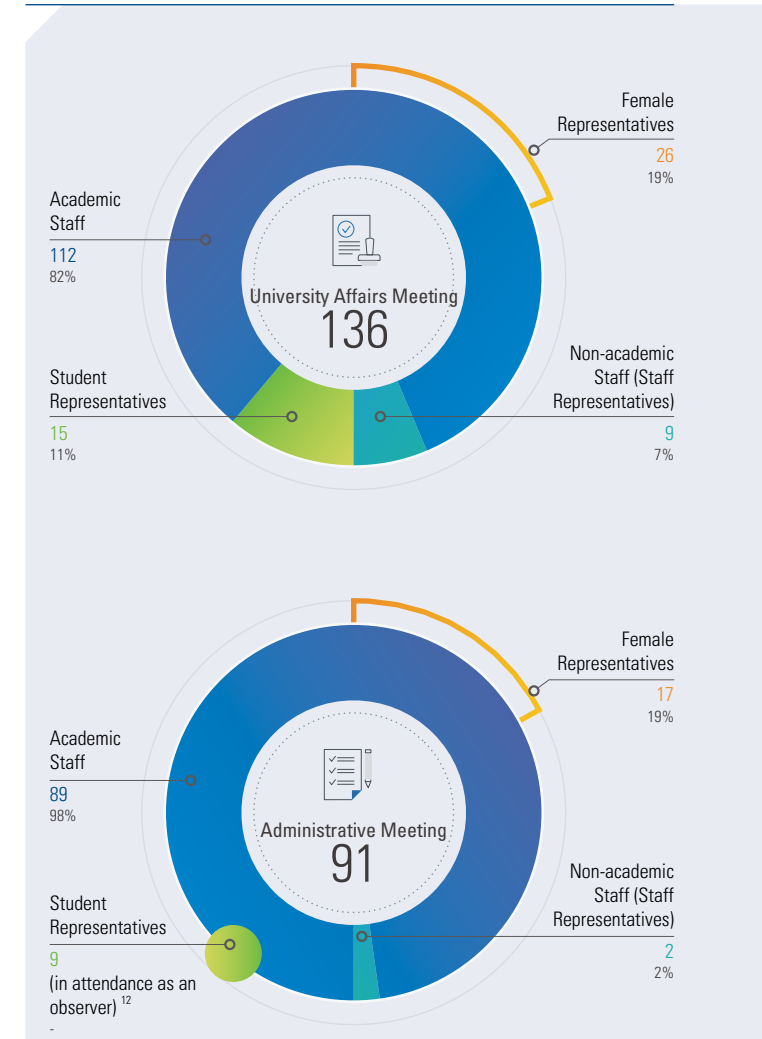
1.4.1 Decision-making Meetings

In order to successfully execute university affairs, NKUST has set up 12 meetings and committees. Among which, important decision-making meetings include the University Affairs Meeting, and the Administrative Meeting, and they are headed by the University Affairs Meeting. The ex-officio representatives of the University Affairs Meeting include the President, Vice President, Deans of level 1 administrative units, Deans of college-level academic units, and Dean of the Affiliated Institute of Continuing Education, with faculty representatives, staff representatives, student representatives, and others as participants. The diversity ensures balanced decisions, and implements university governance.

☑ Meetings and issues to be reviewed



☑ Meeting participants for important decision-making meetings¹¹ in the 2021 academic year



11. The term of office for the meeting participants of important decision-making meetings is from August 1, 2021 to July 31, 2022.

12. Student representatives attend the Administrative Meeting as observers; they are not counted toward the total meeting participants and proportion.

Additionally, in order to promote teamwork, elevate work efficiency, maintain the relevant rights of faculty and staff, and promote labor-management communication and dialogues, NKUST has established relevant committees, review groups, and labor-management meetings to review affairs relevant to faculty and staff.



☑ Issues to be reviewed in meetings relevant to faculty and staff, and meeting participants

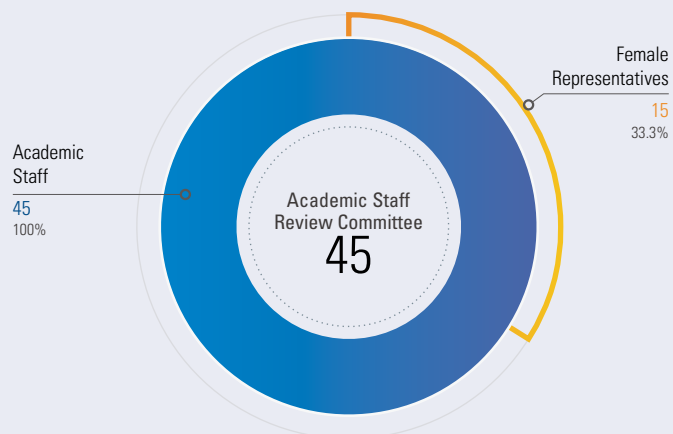


Academic Staff Review Committee

Issues to be Reviewed

The Academic Staff Review Committee reviews the reasons for the appointment, term of appointment, promotion, suspension, dismissal, non-renewal of appointment, and severance of NKUST's faculty, deals with the violations of faculty obligations, and qualification review, and resolves the issues of rewards and punishments, extension studies, academic research, faculty evaluation, extended service, the appointment and promotion of researchers, and other affairs in accordance with laws and decrees.

Meeting Participants

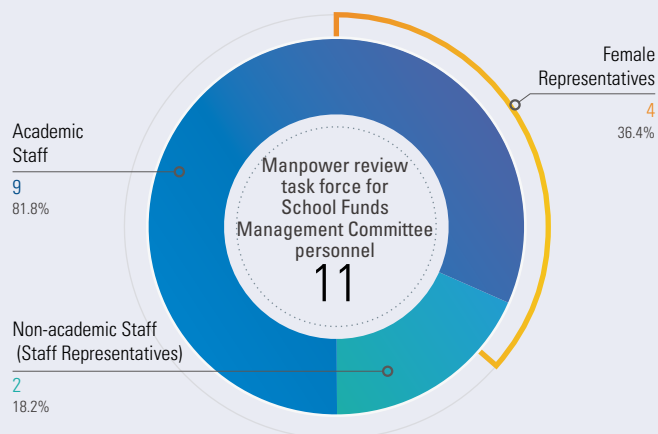


Manpower review task force for School Funds Management Committee personnel¹³

Issues to be Reviewed

The manpower review task force reviews the allocation, manpower planning, category, salary recognition of School Funds Management Committee personnel, other relevant affairs, and temporary affairs.

Meeting Participants

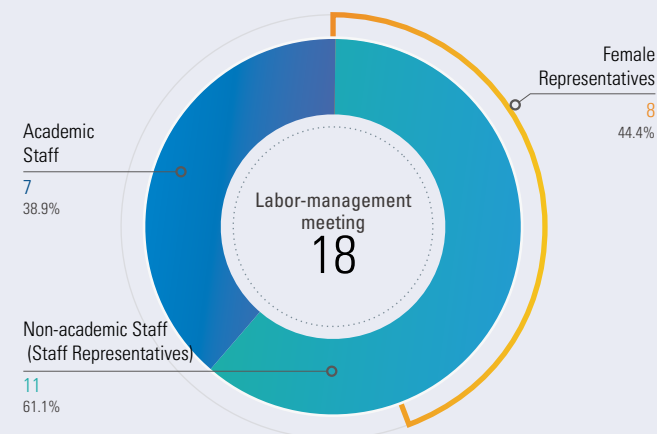


Labor-management meeting¹⁴

Issues to be Reviewed

The labor-management meeting discusses the work hours of laborers, the rights of employees, and affairs that shall be negotiated by both laborers and employers.

Meeting Participants



13. The number of participants for the manpower review task force for School Funds Management Committee personnel was for the 2020 and 2021 academic years.

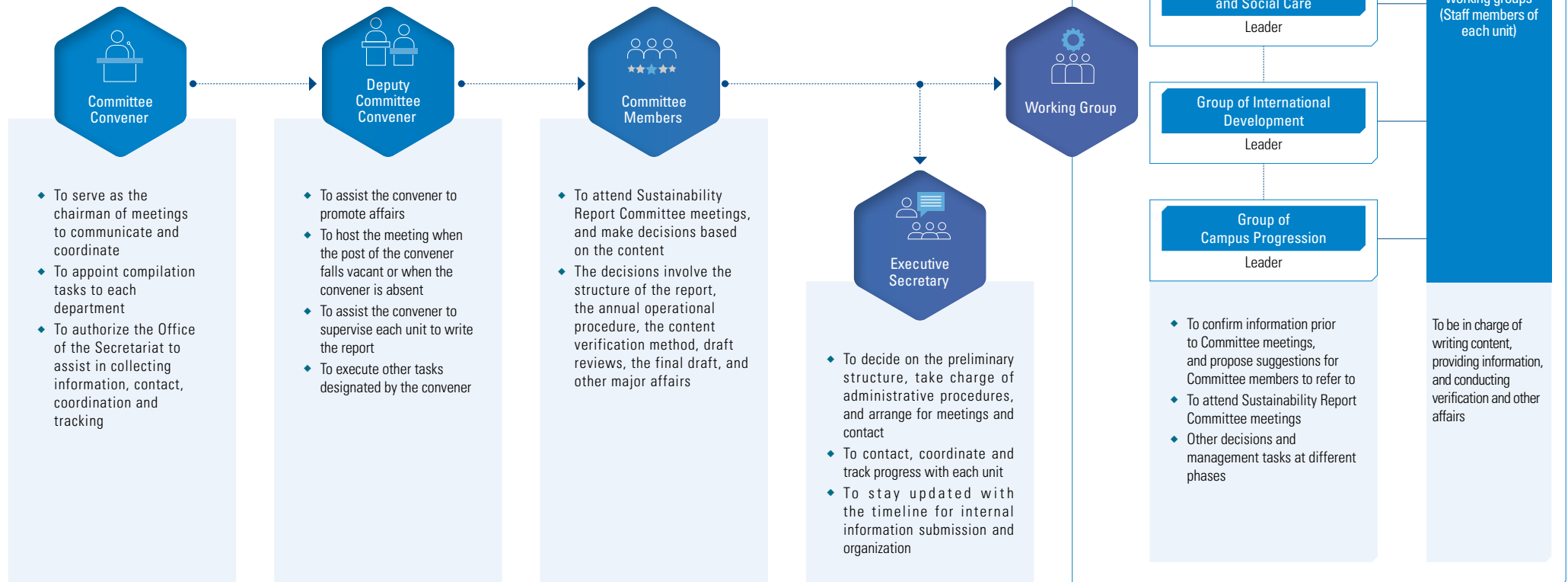
14. The number of participants for the labor-management meeting was the number of participants for its first meeting.

1.4.2 Structure and Responsibilities of the Sustainability Report Committee

NKUST set up the Sustainability Report Committee with tasks divided into different levels to compile this sustainability report, and to ensure all tasks are completed. The President serves as the convener of the Committee, with many members making decisions before the executive secretary team communicates with each working group. NKUST hopes that the Committee and its clearly defined structure can facilitate communication and operations, allowing the university's highlights in sustainability to be fully presented.



✓ Organizational structure and missions of the Sustainability Report Committee and working groups



1.4.3 Internal Control and Risk Analysis

To implement the self-monitoring mechanism, and to reasonably ensure the effective operation of internal control, NKUST has formulated the “Guidelines for the Establishment of Internal Control Task Force at National Kaohsiung University of Science and Technology” in accordance with the “Guidelines for Monitoring Internal Control System at Government Agencies” promulgated by Executive Yuan. The President of NKUST designates the two Vice Presidents of NKUST to serve as the conveners for NKUST’s Internal Control Task Force and Internal Audit Task Force respectively. At least a meeting shall be held every semester. The executive results of internal control and internal audit are shown on the “Statement of Internal Control” signed by the convener of internal control, the convener of internal audit and the President. Detailed information can be found on the [website of NKUST regarding the disclosure of university affairs/internal control and internal audit](#).

Internal control and risk analysis

			
	Internal Control	Internal Audit	Audit of School Funds
Basis	Guidelines for the Establishment of Internal Control Task Force at National Kaohsiung University of Science and Technology.	Guidelines for the Establishment of Internal Audit Task Force at National Kaohsiung University of Science and Technology.	Implementation Guidelines for Audit of School Funds of National Kaohsiung University of Science and Technology.
Mission	The guidelines conduct internal control, internal audit, and relevant educational training. It reviews and strengthens the current operations of internal control. Additionally, it plans and executes the self-evaluation operations of the internal control system.	The guidelines make the annual audit plan, execute the plan, and review the self-evaluation results of the internal control system of each unit.	Based on the results of risk assessment for internal control, NKUST makes an annual audit plan which takes effect upon the approval of the President. Additionally, NKUST makes the plan an annual audit report, and reports to the University Affairs Meeting. Moreover, NKUST tracks deficiencies or abnormalities on a regular basis each year until they are improved.
Execution Points	1. Risk assessment is carried out through rolling basis planning. 2. The annual self-evaluation operation of internal control is conducted. 3. Administrative units are requested to design the complete SOP for authorized businesses.	1. The annual audit plan is made to execute internal audit. 2. The business procedure shall be reviewed and revised on a regular basis with the PDCA (plan-do-check-act) Cycle.	1. Post-audit for human resources, financial affairs, operations, related party transaction involving in the transaction cycle of school funds. 2. Post-audit for handling cash transactions and bad debts. 3. Audit and inventory for cash, bank deposits, negotiable securities, stocks, bonds, and fixed assets. 4. To evaluate, audit and organize the report regarding the achieving rate of performance goals of school funds on a regular basis. 5. Audit and assessment for the utilization and expenditure benefits of school funds. 6. Other projects to be audited.



NKUST regarding the disclosure
of university affairs/internal
control and internal audit



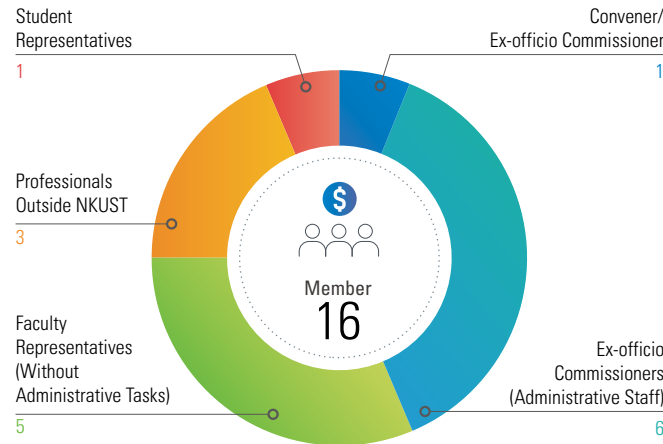
1.5 Financial Affairs and Sustainable Investment

School Funds Management Committee

NKUST formulated the “Guidelines for the Establishment of School Funds Management Committee for National Kaohsiung University of Science and Technology” in accordance with the “Regulations Regarding the Management and Supervision of School Funds at National Universities/Colleges.” The missions of the School Funds Management Committee include the annual review for the estimated budgets for the school funds, the performance evaluation for the balance, and utilization of the school funds, annual financial plans, the review for annual investment plans, and the review for regulations for the balance management of self-financing income. The School Funds Management Committee shall hold a meeting at least once a semester. A temporary meeting shall be convened when necessary.



Members of 2nd NKUST School Funds Management Committee

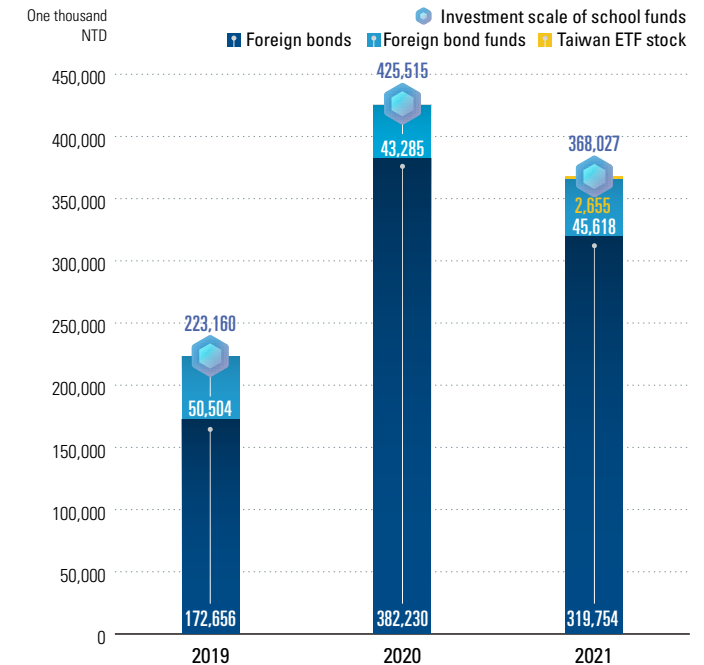


Investment Targets and Size of the School Funds

In accordance with Article 14 of the “Regulations Regarding the Management and Supervision of School Funds at National Universities/Colleges,” NKUST resolved in its 2nd Investment Management Group Meeting in 2020 that the maximum amount of investments for the school funds other than for certificates of deposit (CD) was 10% of available funds, totaling NT\$500 million upon taking the safety stock of cash at NKUST into consideration. As of the end of 2021, the actual investment amount was NT\$368.027 million. The investment targets and amount of NKUST from 2019 to 2021 are shown in the Table below.

Investment targets and size of school funds over the past three years¹⁵

Unit: One thousand NTD



NKUST School Funds Management Committee Mission

School Funds Management Committee Mission

- To review the estimated budgets of school funds.
- To evaluate the performance of balance and utilization of school funds.
- To review the annual financial plan and annual investment plan.
- To review regulations for balance management for self-financing income.
- To review the plan of increasing income and decreasing expenditure for school funds.
- To review the administrative management fees or the planned dividing ratio for the balance of self-financing income.
- To review the payment amount, conditions, methods, and evaluation standards for personnel expenses from self-financing income.
- To review the school funds performance report.
- To review the financial statement and minutes of the Board Directors' Meeting of the Cultural and Education Foundation of National Kaohsiung University of Applied Sciences.
- To review other affairs relevant to the budgets, final accounts, balance, safekeeping, and utilization of school funds.



15. The NKUST merger was completed on February 1, 2018, so no investment was carried out in 2018. As of December 30, 2021, the total number of investment targets included 25 foreign bonds, 6 foreign funds, and 1 Taiwanese ETF stock.



In order to enhance the investment efficiency of the school funds, NKUST will take the safety stock of the school funds into consideration, and will report it to the Investment Management Group Meeting and the School Funds Management Committee for review in accordance with the “Regulations Regarding the Management and Supervision of School Funds at National Universities/Colleges,” and NKUST’s “Guidelines for the Management of Investment Income and Expenditure” to adjust the maximum of investment amount with rolling wave planning. In 2022, NKUST made flexible adjustment to the proportion of investment of the school funds based on the economy by rearranging the proportion of investment bonds to between 50% and 70%, and of other types of investment (including stock, bonds, preferred stock, convertible bonds (CB), or ETF chiefly) to between 0% and 30% respectively.

The investment of the school funds chiefly focuses on long-term investment and stable coupon, and NKUST appropriately allocates the proportion of industries as investment targets to disperse the risk of investing in a single industry. The statistics of the proportion of industries as investment targets of the school funds compiled on December 30, 2021 show that the top five industries include communication services (20.43%), consumption (18.27%), fund (12.09%), medical industry (11.58%), and sovereignty wealth (10.29%).

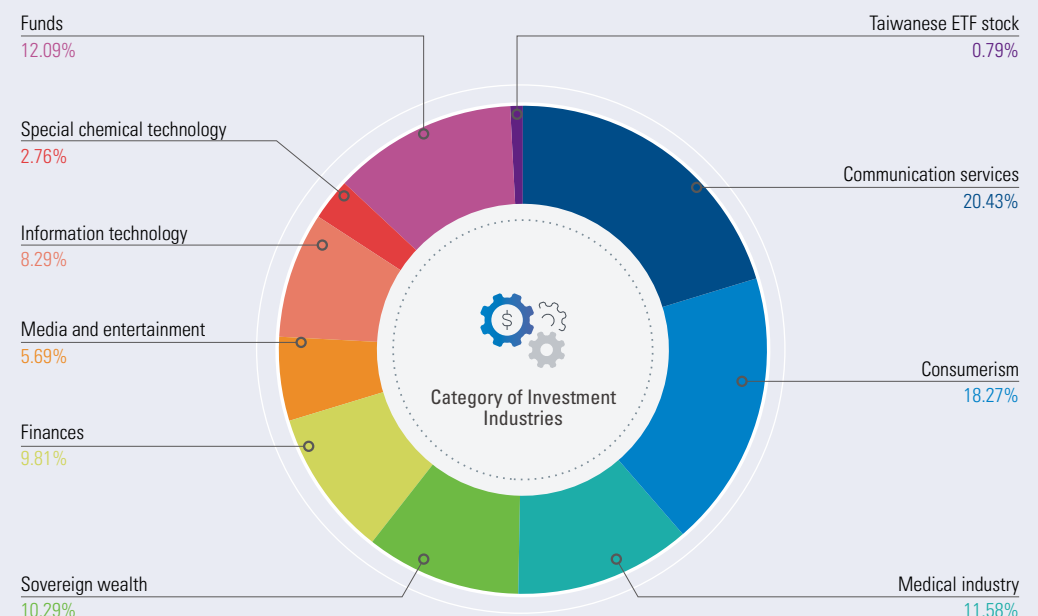
☑ The proportion of industries as investment targets of school funds in 2021

Industries	Investment Proportion (Percentage)	Investment Amount (USD)	Investment Amount (TWD) ¹⁶
Communication services	20.43%	2,491,701.60	74,738,787.00
Consumption	18.27%	2,228,337.50	68,200,981.08
Medical industry	11.58%	1,412,170.00	41,719,923.29
Sovereignty wealth	10.29%	1,255,475.00	37,528,515.63
Finances	9.81%	1,196,176.00	36,865,361.21
Media and entertainment	5.69%	694,105.20	20,390,167.00
Information technology	8.29%	1,011,719.80	30,281,608.00
Special chemical technology	2.76%	336,352.00	10,028,348.00
Fund	12.09%	1,475,223.00	45,618,476.80
Taiwan ETF stock	0.79%	96,108.14	2,655,468.00
Total	100.00%	12,197,368.24	368,027,636.01

16. The present value of new Taiwan dollars was estimated with the spot buying rate of NT\$27.63 to US\$1 announced by the Bank of Taiwan on December 30, 2021.

☑ Industry category of investment of school funds in 2021

Date of the Chart Compiled: December 30, 2021



Sustainable Investment Policy and Timeline

The six Principles for Responsible Investment (PRI) announced by the United Nations indicate that the ESGs shall be incorporated into the process of investment analysis and decision-making. In the 10th point of the “Guidelines for the Management of Investment Income and Expenditure,” NKUST has stipulated that “in making investments, NKUST shall avoid making investments in carbon-intensive industries (especially coal and oil), as well as taking environmental, social and governance factors (ESG) into consideration when selecting targets.” NKUST shall prioritize enterprises with ESG or CSR (corporate social responsibility) concepts, which aim for sustainable and stable management, environmental protection, and social responsibility as its investment targets. Additionally, NKUST shall incorporate these enterprises into the asset allocation of the school funds.

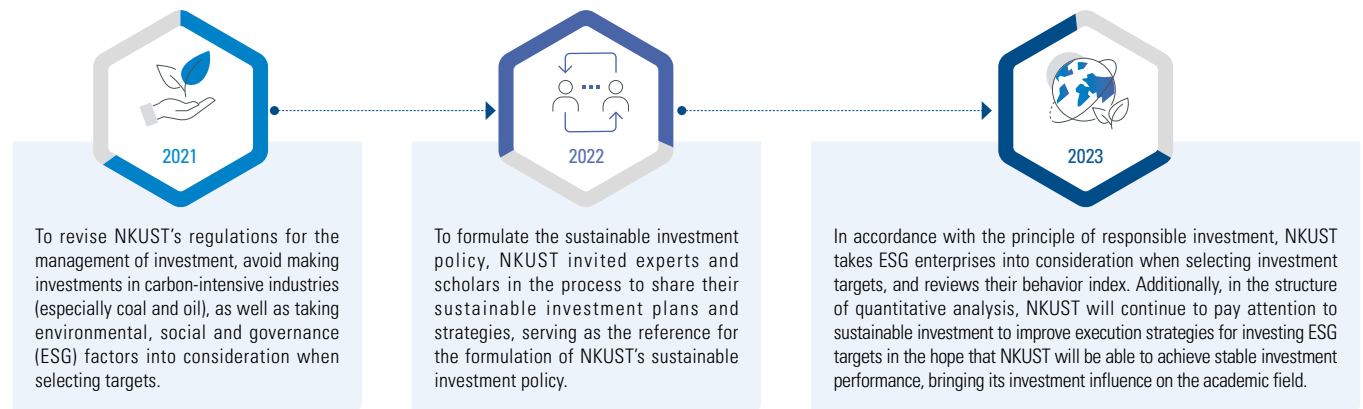
The proportion of industries as sustainable investment targets of NKUST reviewed on December 30, 2021 shows that with respect to bonds, its target companies and national bonds had ESG-related activities and action, which conforms to the “Guidelines for the Management of Investment Income and Expenditure,” responding to NKUST’s sustainable investment policy.

☑ The proportion of industries as sustainable investment targets in 2020 and 2021

Industries	2020			2021		
	Investment Amount	Investment Proportion	ESG Proportion	Investment Amount	Investment Proportion	ESG Proportion
Communication services	2,836,101.60	20.21%	100%	2,491,701.60	20.43%	100%
Consumption	2,128,559.50	15.17%	100%	2,228,337.50	18.27%	100%
Medical industry	1,412,170.00	10.06%	100%	1,412,170.00	11.58%	100%
Sovereignty wealth	1,255,475.00	8.95%	100%	1,255,475.00	10.29%	100%
Finances	1,882,791.00	13.41%	100%	1,196,176.00	9.81%	100%
Media and entertainment	694,105.20	4.95%	100%	694,105.20	5.69%	100%
Information technology	1,346,837.80	9.60%	100%	1,011,719.80	8.29%	100%
Special chemical technology	336,352.00	2.40%	100%	336,352.00	2.76%	100%
Raw materials	760,254.00	5.42%	100%	-	0.00%	100%
Others ¹⁷	1,382,403.00	9.85%	100%	1,571,331.14	12.88%	100%
Total	14,035,049.10	100.00%	-	12,197,368.24	100.00%	-

The planned sustainable investment prospects from 2021 to 2023 are shown in the following Table:

☑ Timeline for sustainable investment



The investment targets of NKUST in 2020 and 2021
conformed to the principle of ESG investment.

17. There are various types of foreign funds and Taiwan's ETF constituent stocks, so they are included in the category of others on this statistical table. Taiwan's ETF investment targets include Yuanta high dividend (0056ETF).

1.6 Stakeholder Engagement

Stakeholders are defined as internal or external groups or individuals who affect or are affected by NKUST's operations, teaching and research, as well as the environment and society. NKUST looks into the stakeholder organizations and individuals' issues of concern as well as establishing a variety of communication channels to facilitate effective two-way communication and feedback, so as to further the university development and construct a diverse and friendly campus environment.

NKUST's stakeholders can be classified as academic and administrative staff, students, alumni, students' parents, enterprises, government agencies, partners, suppliers, and others (surrounding communities/high schools and vocational high schools/media, etc.). Relevant groups and their forms of communication, as well as their issues of concern and frequency, are shown in the following Table:



Group of stakeholders and forms of communication

Group of Stakeholders

Issues of Concern

Form of Communication and Frequency

Academic and Administrative Staff



- ◆ University affairs governance
- ◆ Financial performance
- ◆ Sustainable development
- ◆ Teaching and research environment
- ◆ Career development and training
- ◆ Occupational safety and health
- ◆ Industry-academia collaboration
- ◆ Compensation and benefits

Suggestion System	Anytime
Administrative Service Satisfaction Survey	Once every year
University Affairs Meeting	Two meetings every semester
Administrative Meeting	One meeting every month
Relevant committee meetings	Held when necessary
University-level research center forum	Occasionally
Administrative and academic exchange forum	One forum every semester
Public hearing	Occasionally
Academic affairs exchange meeting	One exchange meeting every academic year
Faculty and staff grievance	Reviewing the case when there is one
Labor-management meeting	One meeting every three months
University website and section of university affairs disclosure	Anytime
Mailbox of each unit	Anytime

Students



- ◆ School reputation
- ◆ Teaching quality and resources
- ◆ Learning environment and outcomes
- ◆ Curriculum planning
- ◆ Measures for awards and financial aids
- ◆ Internship and employment opportunities
- ◆ Campus health and safety
- ◆ Campus facilities

Suggestion System	Anytime
Administrative Service Satisfaction Survey	Once every year
Internship Satisfaction Survey	Once every academic year
University Affairs Meeting	Two meetings every semester
ISP meetings for students with physical and mental disabilities	Held when necessary
Meet the President	One forum every semester
Relevant committee meetings	Held when necessary
Dorm conference	One forum every semester
Student grievance	Reviewing the case when there is one
University website and section of university affairs disclosure	Anytime
Mailbox of each unit	Anytime

🕒 Group of stakeholders and forms of communication

Group of Stakeholders

Issues of Concern

Form of Communication and Frequency

Alumni



- ◆ School reputation
- ◆ University affairs governance
- ◆ Sustainable development
- ◆ Financial performance
- ◆ Industry-academia collaboration
- ◆ Social responsibility
- ◆ Continuing and extension education

Suggestion System	Anytime
Employer Satisfaction Survey	Once every academic year
Career destination survey	Once every academic year
Alumni service system	Held when necessary
NKUST Alumni Center website	Anytime
Internship and Career Development Counseling website and social media	Anytime
Selection of outstanding alumni	Once every year
University anniversary celebration	One event every year
University website and section of university affairs disclosure	Anytime
Mailbox of each unit	Anytime

Students' Parents



- ◆ School reputation
- ◆ Teaching quality and resources
- ◆ Learning environment and outcomes
- ◆ Curriculum planning
- ◆ Measures for awards and financial aids
- ◆ Internship and employment opportunities

Suggestion System	Anytime
ISP meetings for students with physical and mental disabilities	Held when necessary
Admissions briefing	Held when necessary
Briefing for parents of prospective students	Held when necessary
University website and section of university affairs disclosure	Anytime

Enterprises



- ◆ University affairs governance
- ◆ Sustainable development
- ◆ Financial performance
- ◆ School reputation
- ◆ University affairs and quality assurance for departments and graduate institutes
- ◆ Internship and employment opportunities
- ◆ R&D capacity
- ◆ Quality and abilities of students

Suggestion System	Anytime
Internship Satisfaction Survey	Once every academic year
Employer Satisfaction Survey	Once every academic year
Internship and Career Development Counseling website and social media	Anytime
Meetings and seminars for various types of projects	Held when necessary
Public websites for various types of projects	Anytime
Contact enterprises to formulate industry-academia collaboration plans	Held when necessary
Industry-university match-making meeting, industry-university exchange meeting; enterprise briefing	Held when necessary
University website and section of university affairs disclosure	Anytime
Mailbox of each unit	Anytime

Government Agencies



- ◆ University affairs governance
- ◆ Sustainable development
- ◆ Financial performance
- ◆ University affairs and quality assurance for departments and graduate institutes
- ◆ Procurement policy
- ◆ Teaching quality and resources
- ◆ Occupational safety and health
- ◆ Legal compliance

Meeting for colleges in Kaohsiung City	Held when necessary
Dean meeting for all colleges in Taiwan	At least 4 meetings every year
University affairs database	Twice every year
Official correspondence and on-site visit	About 800 cases every month
Meetings and seminars for various types of projects	Held when necessary
Public websites for various types of projects	Anytime
Certification of various professional institutions, and self-evaluation of academic units	Held when necessary
University website and section of university affairs disclosure	Anytime

🕒 Group of stakeholders and forms of communication

Group of Stakeholders

Issues of Concern

Form of Communication and Frequency

Partners



- ◆ University affairs governance
- ◆ Sustainable development
- ◆ Financial performance
- ◆ Curriculum planning
- ◆ Industry-academia collaboration
- ◆ R&D capacity
- ◆ Quality and abilities of students

Suggestion System	Anytime
Technology transfer/licensing	Occasionally
Meetings and seminars for various types of projects	Held when necessary
Public websites for various types of projects	Anytime
Industry-university match-making platform	Anytime
University website and section of university affairs disclosure	Anytime
Mailbox of each unit	Anytime

Suppliers



- ◆ Sustainable development
- ◆ Financial performance
- ◆ Procurement policy
- ◆ Supplier management

Suggestion System	Anytime
Tender evaluation meetings	At least 3 meetings every year
Procurement evaluation meetings	At least 3 meetings every year
Meetings with employees of contractors	One event every year
Educational training for suppliers	Once every year
University website and section of university affairs disclosure	Anytime
Mailbox of each unit	Anytime

Others

(Surrounding Communities/High Schools and Vocational High Schools/Media, etc.)



- ◆ Sustainable development
- ◆ Social justice
- ◆ Community development
- ◆ Social responsibility
- ◆ Legal compliance
- ◆ Continuing and extension education
- ◆ Environmental and ecological conservation
- ◆ Waste and sewage treatment

Suggestion System	Anytime
Extension education meeting	Held when necessary
Volunteer service and social practice (visits and exchanges)	At least 6 venues every year
Landlord forum	One event every year
Advocacy and mock interview for high school students	Around 30 sessions every year
Initiative to issue news articles and hold press conferences	Occasionally
Develop self-media	Occasionally
University website and section of university affairs disclosure	Anytime
Mailbox of each unit	Anytime

In 2021, there were a total of
35,320,000 visits
to the official website of NKUST.

In 2021, NKUST handled **573** suggestions
for university affairs.



▲ The Homepage of NKUST website

CHAPTER 2

Social Integration and Contributions

2.1
Diversity and
Well-being

2.2
Implementation of Campus
Sustainability

2.3
International
Exchanges

2.4
Resource
Sharing

2.1 Diversity and Well-being

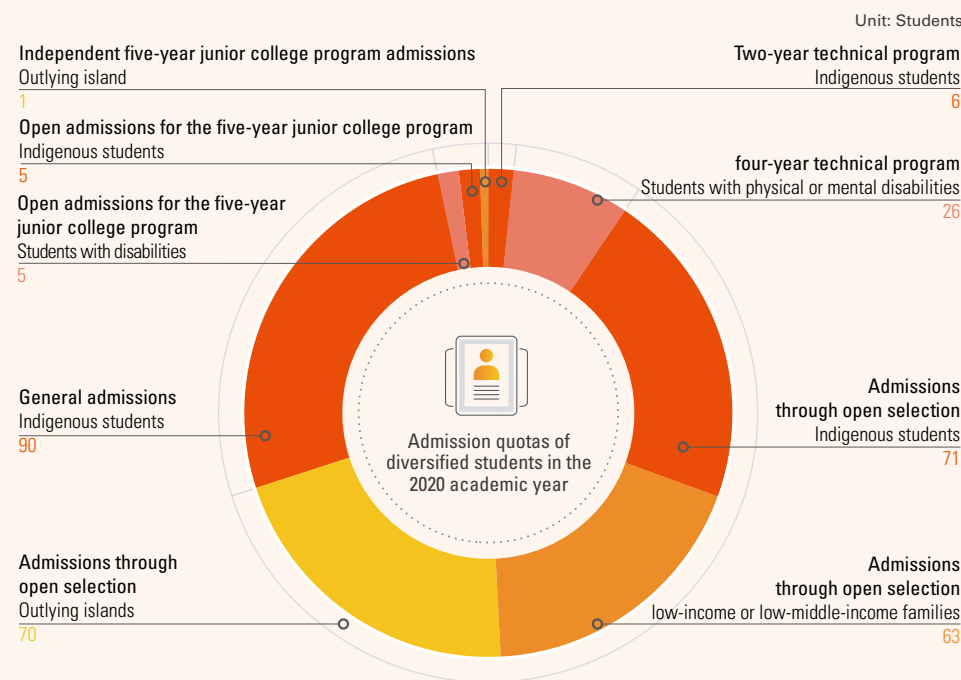
2.1.1 Enrollment and Measures for Disadvantaged Students

NKUST has always been committed to promoting access to higher education. Therefore, to improve the support mechanism for disadvantaged students to study at NKUST, to effectively promote social mobility, and to actively respond to the policy of the Ministry of Education, NKUST has been enrolling more financially disadvantaged students, and elevating the proportion of disadvantaged students at the university. To support financially disadvantaged students, the university subsidizes registration fees for the entrance examination, and transportation and accommodation fees, and gives them other practical help.

In order to support disadvantaged students to pursue higher education, NKUST provides various enrollment channels in NKUST's daytime four-year technical program to enroll diversified students. In the 2020 academic year, 6 indigenous students in the two-year technical program, and 26 students with disabilities in the four-year technical program were enrolled. 63 students from low-income or low-middle-income families, 71 indigenous students, 70 students from outlying islands received admissions through open selection. 90 indigenous students were enrolled through general admissions. Last but not least, 5 indigenous students and 5 students with disabilities were accepted through open admissions for the five-year junior college program, and 1 student from the outlying island was in through the independent five-year junior college program admissions. Additionally, NKUST fortifies and expands its enrollment campaigns and channels. For example, the university runs campaigns at high schools or vocational high schools in rural areas, and the students are also invited to the campus to experience it for themselves. These visits help the students have better understanding of professional fields at NKUST, increasing their willingness to study at the university. In the 2021 academic year, a total of 1,517 students participated in NKUST's enrollment campaigns. In 2021, due to the COVID-19 pandemic, interviews and hands-on experiments at the university were canceled for numerous admission channels such as admissions by selection for the four-year technical program, and application for admissions for the two-year technical program, resulting in a great decline in the number of students applying for transportation and accommodation subsidies that year. However, a total of 40 disadvantaged students were still subsidized for their entrance examination fees. NKUST hopes that socially and financially disadvantaged students with great academic achievements and potential can still enjoy the opportunity to receive higher education, and that these assistance measures will help promote class mobility.



A total of **1,517** students participated in **12** sessions of enrollment campaigns held by NKUST in 2021.



Number of disadvantaged students in the 2020 academic year

Disadvantaged Student Categories	Number of Students
Low-income households	450 students
Low-middle-income households	680 students
Children of families in hardship	101 students
Students with physical or mental disabilities	981 students
Indigenous students	273 students
Other students eligible for financial aid for disadvantaged students in universities and colleges	1,094 students
Total	3,579 students

To recruit students with excellent academic achievements and to improve students' learning quality, NKUST has planned on awarding students with excellent grades on the entrance examination scholarships since the 2018 academic year. Additionally, the university's scholarships have been expanded to award to students enrolled at the university's graduate program since the 2020 academic year to encourage outstanding undergraduate students graduating from NKUST to study at the university's graduate program. The number of students receiving the scholarships has been increasing year by year, which shows the great results of the incentives. A total of 95 students, 106 students, 398 students, and 405 students received the awards in the 2018, 2019, 2020, and 2021 academic years respectively. Meanwhile, to encourage students to study hard and elevate learning climate on campus, the top three students from the five-year junior college program and the undergraduate program receive awards and the certificates of merit, with the first prize NT\$4,000, the second prize NT\$3,000, and the third prize NT\$2,000. The number of award receivers was 1,733, 2,201 and 1,251 (as of January 2021) in the 2019, 2020, and 2021 academic years respectively. The awards have effectively encouraged students to strive for honor, elevating their learning outcomes.

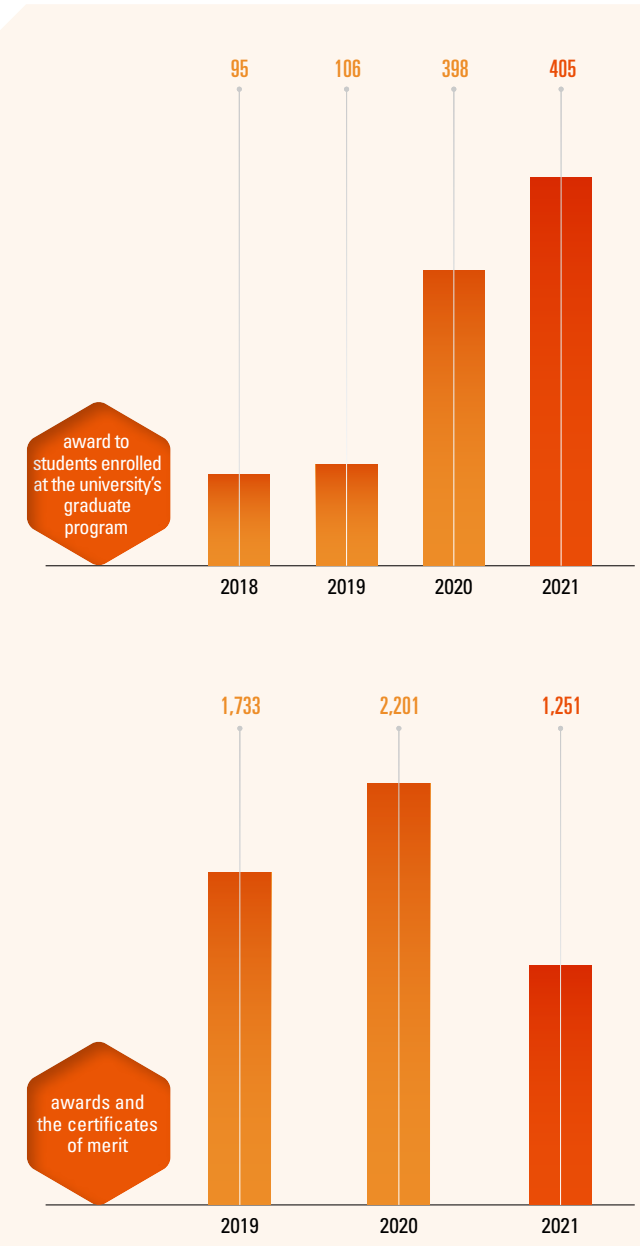
Education has long played a key role in enhancing social mobility. Additionally, eliminating the urban-rural gap in education and achieving balance in teaching resources are the responsibilities and goals of higher education. Therefore, NKUST thinks higher education should safeguard competent students' rights to learning and education. To cultivate diverse abilities for financially disadvantaged students¹⁸, increase learning effectiveness, and reduce their burdens, NKUST has formulated over 10 incentives to care for financially disadvantaged students throughout their university years with diverse methods (as shown in the following Table).

Amount of incentives for financially disadvantaged students

Item	2020			2021		
	Number of Recipients	Amount Awarded	Percentage	Number of Recipients	Amount Awarded	Percentage ¹⁹
Class tutoring (Learning goals achieved)	123	578,000	0.4%	844	1,306,000	3.0%
Self-directed learning plan (Homework and schoolwork)	550	7,787,000	2.0%	369	14,504,000	1.3%
Study counseling	263	263,000	1.0%	-	-	-
Career planning and assistance from counseling	369	354,700	1.3%	91	163,500	0.3%
Job matching	134	189,472	0.5%	194	208,284	0.7%
License counseling	180	525,318	0.7%	341	942,841	1.2%
Learning empowerment for outstanding students (Enhancing empowerment)	60	2,335,000	0.2%	44	2,044,000	0.2%
Top-notch competitions	29	84,197	0.1%	10	49,920	0.04%
Social service empowerment	55	1,160,200	0.2%	-	-	-
Leadership coaching and diversified empowerment	370	1,110,000	1.4%	199	597,000	0.7%
Professional service	-	-	-	211	633,000	0.8%
Total	2,133	14,386,887	7.8%	2,303	20,448,545	8.24%

18. Financially disadvantaged students include students from low-income households, low-middle-income households, children and grandchildren of families in hardship, students with physical and mental disabilities, children of persons with physical and mental disabilities, students eligible for the disadvantaged student program of colleges and universities, indigenous students, students who have encountered family emergencies and have been approved by the university.

19. The percentage of incentives is divided by the total number of students during the year. There were a total of 27,389 students for the undergraduate, graduate and PhD programs in the 2020 academic year, and 27,791 in the 2021 academic year. The number of students in the academic year is calculated based on the number of students in the first semester.



In addition to providing student loans, tuition and fees reduction, and scholarships and bursaries for disadvantaged students in universities and colleges, as regulated by the national government, NKUST has designed measures for disadvantaged students with different conditions, set up the Project of Lighting for Disadvantaged Students, Financial Aids with Love, Spring Sunshine financial aids, 3Q scholarships, and so on, which are all donated by enthusiastic alumni, faculty and staff, and people outside NKUST to provide disadvantaged students with various financial aids, reducing their economic burdens throughout their university years.

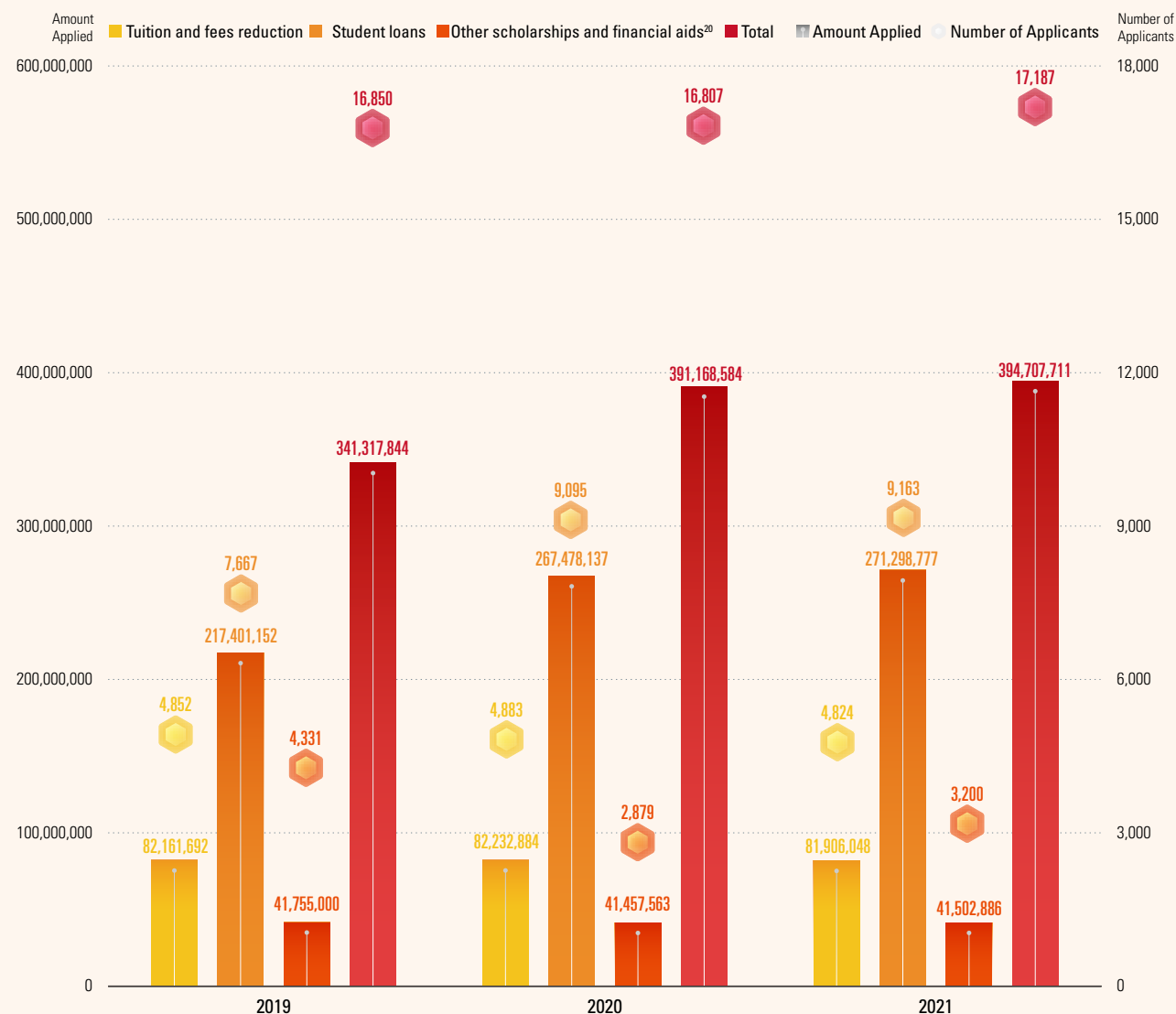
Sources and types of scholarships, bursaries and financial aids, number of receivers and amount awarded at NKUST in 2021

Sources and Types of Scholarships, Bursaries and Financial Aids	Number of Recipients	Amount Awarded
University expenses	4,972	69,495,017
Donations from outside the university	554	3,160,000
Scholarships from enterprises or foundations	138	6,161,994
Subsidies from the government	4,523	32,183,887
Total	10,187	111,000,898

Applications status for various student assistance measures in 2021

Various Student Assistance Measures	Amount Applied	Number of Applicants
Tuition and fees reduction	81,906,048	4,824
Student loans	271,298,777	9,163
Financial aids for student living expenses	14,268,000	564
Financial aids for disadvantaged students in universities and colleges	15,003,750	1,094
Student emergency allowance	1,470,000	118
Tuition free of charge in the first three years at the five-year junior college program	7,435,486	979
Off-campus housing subsidies	3,325,650	445
Total	394,707,711	17,187

Applications status for various student assistance measures over the past three years



20. Other scholarships and bursaries include financial aids for student living expenses, financial aids for disadvantaged students in universities and colleges, student emergency allowance, tuition free of charge in the first three years at the five-year junior college program, and off-campus housing subsidy.

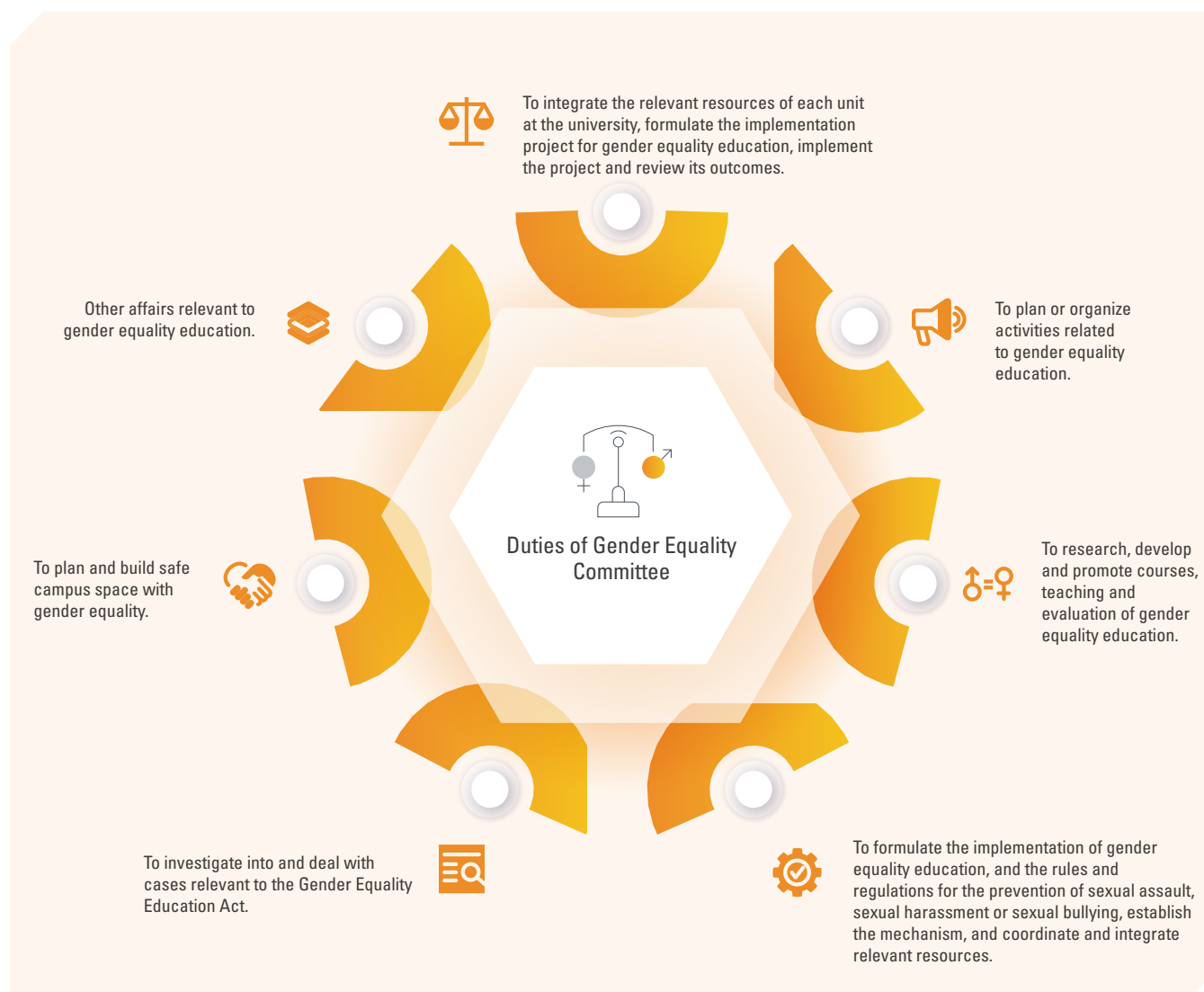
2.1.2 Gender Equality Area

To promote substantial gender equality, NKUST integrates the university's resources and promotes gender equality education in the hope of elevating gender equality awareness on campus by setting up the Gender Equality Committee. The duties of the Gender Equality Committee are as shown in the following Chart. With respect to the university's curricula and policies, NKUST organizes gender equality courses and campaigns for mental health, guiding students to explore relationships and gender interaction skills to create a gender-friendly atmosphere. Over 1,000 students on average every year take courses related to gender equality. The university holds nearly 30 sessions of the campaign, reaching over 500 students. As for campus constructions, NKUST has built gender-friendly restrooms, establishing a gender-friendly campus environment.

NKUST has set up a Gender Equality section on the home page of the university's website to provide resources relevant to the promotional education for gender equality incidents and relief channels for gender equality incidents on campus in the hope that the university will continue to promote a gender-friendly campus through relevant measures. Take the relief channels for gender equality incidents for example, the Gender Equality section provides the "Application for the Investigation of a Campus Sexual Assault or Sexual Harassment Case" and the "Re-Application for the Investigation of a Campus Sexual Assault, Sexual Harassment or Sexual Bullying Case" and relevant methods for the persons involved to apply for relief. In fact, the prevention of such incidents is absolutely more important than handling them afterwards. Therefore, NKUST has organized educational training for the prevention of sexual harassment, promulgated a written statement of forbidding sexual harassment in the workplace, and requested that all faculty and staff sign it to construct a gender-friendly and safe working environment.

Additionally, NKUST encourages the university's faculty and staff to participate in gender-related courses and recommends that they take part in mainstream gender courses off campus every year to improve their knowledge about gender equality, and to serve as an opportunity for them to exchange opinions with others. In 2021, a total of 193 members of faculty and staff completed the learning hours for mainstream gender courses.

☑ Duties of Gender Equality Committee



2.1.3 Grievance Mechanism

When students, faculty and staff have any grievance at school and at work, protest might be a feasible channel. NKUST provides unimpeded communication channels, and has established a systematic, fair and justice grievance mechanism. The following will expound the grievance channels for students, faculty and staff, and the grievance mechanism relevant to gender equality mentioned in the previous section.

◆ Student Grievance Channels

To safeguard the students' rights in education and school life, NKUST formulated the "Guidelines for Student Grievance." In addition, the "Student Grievance and Appraisal Committee" was set up and formed by students, faculty and external representatives in accordance with the guidelines to address grievances from students, student unions and other student self-governing organizations.

◆ Faculty and Staff Grievance Channels

In accordance with the rights to legal empowerment of relief, NKUST has set up a teacher grievance system to enable teachers to propose their grievance cases when their rights and interests are infringed by illegal or inappropriate measures relevant to their own rights and interests at the university. Their cases are reviewed by the Teacher Grievance and Appraisal Committee. The committee is composed of representatives assigned by each college at the university and 2 off-campus legal professionals to protect the basic human rights of teachers. Relevant rules and regulations are

in accordance with the "Organization and Review Guidelines of National Kaohsiung University of Science and Technology Teacher Grievance and Appraisal Committee."

When staff and workers (e.g. public servants, personnel of the School Funds Management Committee, technicians, janitors and security guards) consider their rights and interests being affected because the university's management measures or the handling of their working conditions are illegal or inappropriate, or their application cases fail to be processed by a stipulated deadline, they shall propose their grievance to the university's Staff and Worker Grievance Review Committee in accordance with the "Organization and Review Guidelines of National Kaohsiung University of Science and Technology Staff and Worker Grievance Review Committee."

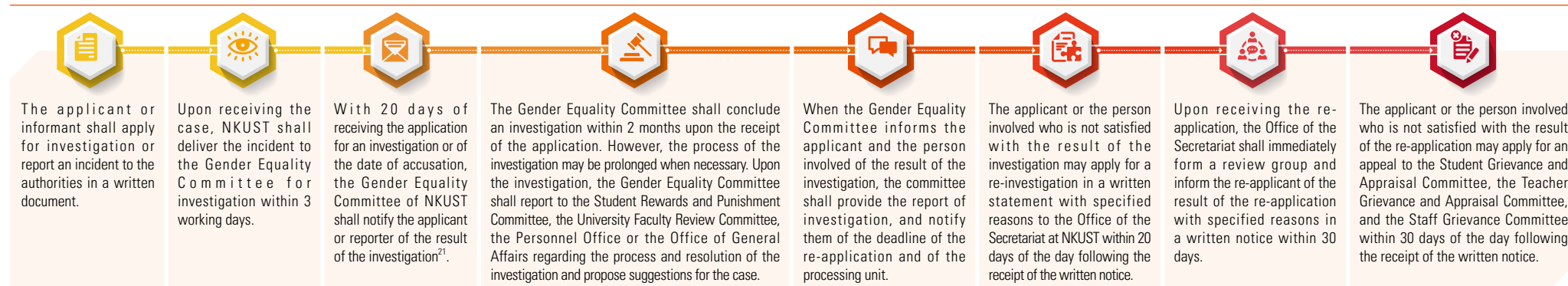
To protect the faculty and staff from illegal infringement while performing their duties, NKUST has formulated the "Prevention Plan of Illegal Infringement While Performing Duties." Employees who suffer from physical or mental harm caused by their supervisors, colleagues, targets of service or other third parties while performing their duties in the workplace can report to the university to protect their rights and interests. Upon receiving the report, the President will convene relevant personnel to form the "Task Force for Illegal Infringement Incidents in the Workplace." Professionals are recruited to provide assistance when necessary.

◆ Campus Gender Equality Incident Grievance Channels

In accordance with Taiwan's "Gender Equity Education Act," and NKUST's "Regulations for the Prevention of Sexual Assault, Sexual Harassment or Sexual Bullying on Campus," and "Regulations for the Preventive Measures, Grievance and Punishment of Sexual Harassment for Faculty and Staff," NKUST has set up the Gender Equality Education Committee (hereinafter referred to as the Gender Equality Committee) to serve as a designated division for handling and investigating into sexual harassment, sexual assault, or sexual bullying incidents among faculty, staff and students at the university, providing a relevant grievance channel for them. Meanwhile, the Gender Equality Committee integrates psychological counseling resources and protective measures, shouldering the responsibility of "counseling" and "protection."

Moreover, NKUST has formulated the "Regulations for the Preventive Measures, Grievance and Punishment of Sexual Harassment for Faculty and Staff," and set up the Sexual Harassment Grievance and Appraisal Committee for Faculty and Staff to handle and investigate into sexual harassment grievance cases among faculty and staff at the university. Meanwhile, NKUST fulfills the preventive responsibility of an employer by setting up a contact window to receive grievance, providing persons involved with psychological counseling or treatment and transfer services, and punishing persons whose misdemeanors have been confirmed upon investigation.

☑ Procedure of handling gender equality incidents



21. The applicant or reporter may apply for a re-application to the Gender Equality Committee in a written document with specified reasons within 20 days if they do not receive any notice within the aforementioned working days, or if they receive the notice of non-acceptance. Upon the receipt of the re-application, the Gender Equality Committee shall notify the re-applicant of the result of the re-application in a written notice within 20 days. The Gender Equality Committee shall immediately conduct an investigation into any re-application with specified reasons.

2.1.4 Diversified Staff Composition

The number of students enrolled in NKUST in 2021 was 28,589, with 64% males and 36% females. Compared to the statistics from the year 2021 announced by the Department of Statistics, Ministry of Education, the gender ratio of college and university students in engineering, manufacturing, and construction departments (institutes) was 80.84% males and 19.16% females, indicating that the gap in student gender ratio is small at NKUST.

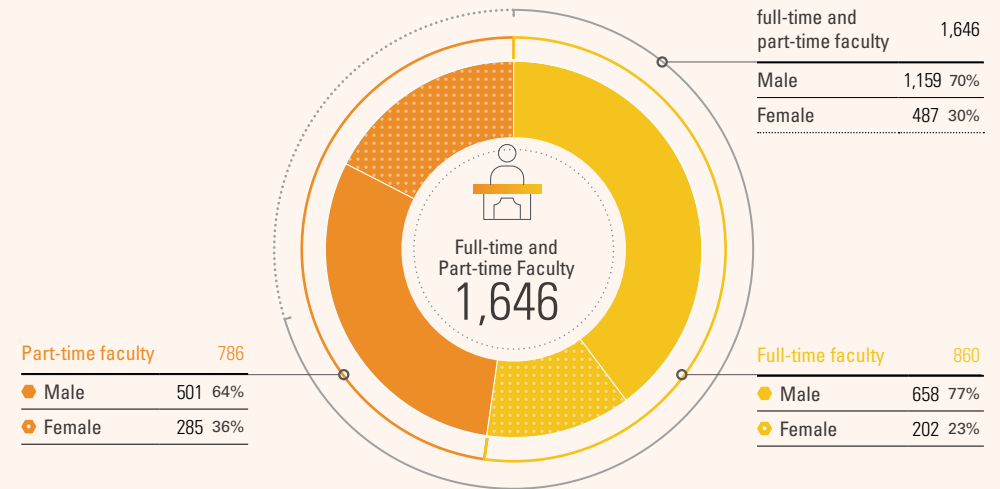
As NKUST has a great number of students, it is essential to maintain the appropriate teacher-student ratio to safeguard the students' rights in education and care quality. The university had 860 full-time teachers, and 786 part-time teachers, with 1,159 males and 487 females in total in 2021.

Over the past few years, NKUST has been dedicated to promoting internationalization and elevating its international fame, which leads to the growth of number of international students (including foreign students, overseas Chinese students, students from Hong Kong and Macao, and students from China) year by year. In 2021, a total of 741 international students studied at the university.

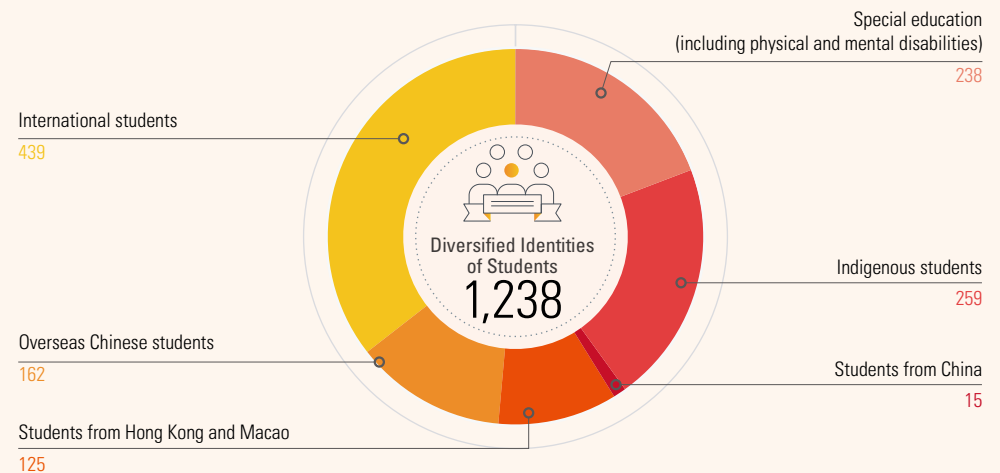
Statistics of total number and gender of students

Type of Students		Number of Males	Number of Females	Total Number
Daytime School	PhD program	465 (75%)	156 (25%)	621
	Graduate program	1,722 (68%)	808 (32%)	2,530
	Four-year technical program	10,790 (62%)	6,663 (38%)	17,453
	Second-year technical program	269 (61%)	170 (39%)	439
	Five-year junior college program	650 (81%)	148 (19%)	798
Division of Continuing Education	Four-year technical program	2,640 (67%)	1,298 (33%)	3,938
	Second-year technical program	69 (61%)	44 (39%)	113
	In-service graduate program	1,290 (64%)	720 (36%)	2,010
Affiliated Institute of Continuing Education	Second-year technical program	368 (54%)	319 (46%)	687
Total		18,263 (64%)	10,326 (36%)	28,589

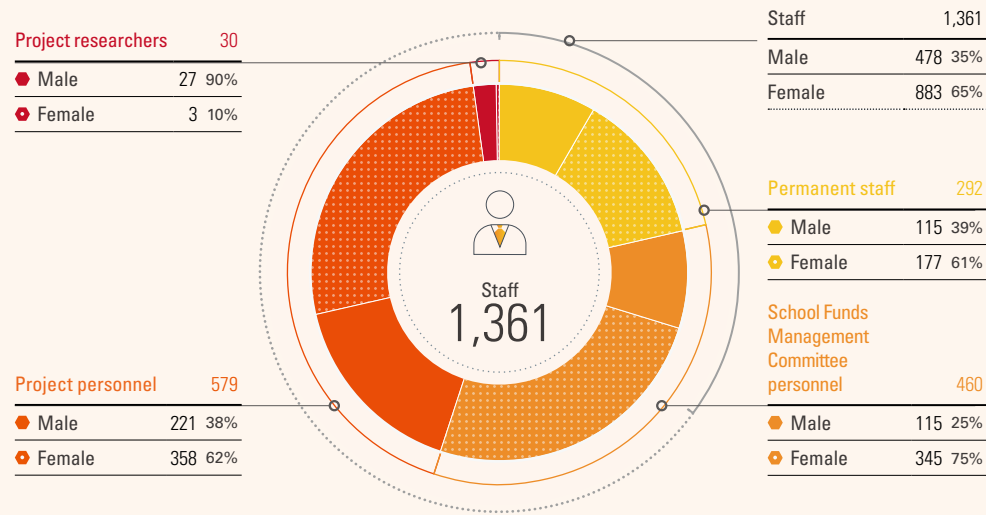
Statistics of total number and gender of full-time and part-time faculty



Statistics of diversified identities of students in 2021



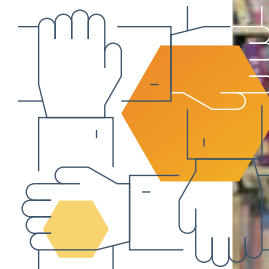
Statistics of total number and gender of staff



Percentage of new employees and turnover rate in 2021

Type of Faculty and Staff		Total Number at the End of 2021	Number of New Employees (Percentage)	Number of Resigned Faculty and Staff (Percentage)
Faculty	Male	659	27 (4%)	9 (1%)
	Female	202	6 (3%)	2 (1%)
Permanent staff	Male	110	3 (3%)	8 (7%)
	Female	175	6 (3%)	9 (5%)
School Funds Management Committee personnel	Male	120	19 (16%)	21 (18%)
	Female	350	61 (17%)	41 (12%)
Project personnel	Male	221	81 (37%)	75 (34%)
	Female	358	162 (45%)	91 (25%)
Project researcher	Male	27	8 (30%)	4 (15%)
	Female	3	3 (100%)	1 (33%)
Total		2,225	376 (17%)	261 (12%)

In addition to continuing to improve counseling resources for international students, NKUST has set up a “study buddy system” to help international students adapt to life in Taiwan, as well as promote cultural integration among international students and Taiwanese students. Study buddies for international students are selected each semester to assist international students to solve problems in their daily lives and schoolwork, enabling overseas Chinese students and international students to adapt to life in a foreign country in a timely manner. Meanwhile, NKUST occasionally holds various activities, including festivals and ceremonies, visits to Taiwan’s cultural sites, events featuring NKUST as well as industrial exploration events. Moreover, international students are encouraged to establish student clubs to pass down their experiences of life and studying in Taiwan to other international students. For example, a student club named Overseas Chinese Students Association for international students organizes various events during the festive season, enabling overseas Chinese students from different countries to learn more about Taiwan’s culture, and experience the passion of local Taiwanese, which encourages interactions and mutual help among peers.



2.1.5 Compensation and Benefits

The compensation of all personnel at NKUST is granted in accordance with relevant regulations. Take full-time faculty and staff for example, their compensation is in line with the basic salary regulations stipulated by the Ministry of Labor. If the Ministry of Labor announces an adjustment of the minimum wage that year, the university will follow suit to protect the rights of all personnel. The compensation and benefits of employees at NKUST are higher than the stipulated minimum wage. The ratios of the basic salary of teachers, staff, technicians, janitors and security guards, and contracted personnel to the minimum wage were 242%, 126%, 106% and 102% respectively, which were higher than the amount of basic salary announced in 2021 by the Ministry of Labor as shown in the following Table.

Ratio of minimum wage to basic salary of employees at NKUST

Type of Employees	Minimum Wage	Ratio of Minimum Wage to Basic Salary
Teachers (Instructors)	58,135	242%
Public servants	30,235	126%
Technicians, janitors and security guards	25,365	106%
Contracted personnel	24,495	102%
Minimum basic wage	24,000	-

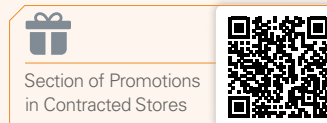
To recruit and retain exceptional talents in order to enhance the NKUST's international vision and academic competitiveness, the Ministry of Education's "Revised Implementation of Flexible Salary Plan for Recruiting and Retaining Exceptional Talents at Colleges and Universities" was used as the reference for NKUST's "Guidelines for Recruiting and Retaining Exceptional Talents" to reward exceptional faculty members with the incentive of flexible salary. The guidelines are divided into the categories of research, industry-academia collaboration, teaching and service in the hope that exceptional teachers and talents with different specialties at the university can obtain substantial encouragement from incentives, enhancing the entire performance of the university together. In 2020, a total of 65 exceptional teachers received the Flexible Salary Award, 65 in the category of teaching, and 13 in the category of counseling and service.

Additionally, NKUST conducts the online Administrative Service Satisfaction Survey on a regular basis to seek advice and opinions from all faculty, staff and students of the university. The results of the survey serve as feedback for each administrative division to refer to.

In addition to basic salary and awards for full-time personnel, the faculty and staff of NKUST enjoy various benefits listed as follows:

In accordance with the Budget Standards for Common Expenditures prescribed in 2021, NT\$2,000 was budgeted for each permanent faculty and staff member (including project teachers) and personnel of the School Funds Management Committee. The expenditures were used to organize various welfare measures, as well as cultural, art and recreational activities such as birthday celebrations for faculty and staff, birthday gifts, subsidies for cultural, art and recreational activities, and annual raffle prizes.

Due to the lifestyle of Taiwan's society, double-income families with young children mostly have parenting needs. NKUST surveys the needs of employees every year. Additionally, based on the needs and recommendation of the university's staff, the university signs contracts regarding promotions with daycare organizations. Up until the beginning of 2022, the university signed the contract with 20 kindergartens and daycare centers which provide exemption or discounts for the registration fee, free school uniforms and other promotions.



2.1.6 Physical and Mental Health

With fast and efficient pace in society, pressure and anxiety caused by high uncertainty are spreading among college students. Additionally, colorful college life affects the students' lifestyles and eating habits. Therefore, it has become an issue of concern to NKUST to help the students stay physically and mentally fit throughout their university years. In addition to providing basic emergency treatment and care for injuries and illnesses, the university's website has a COVID-19 Prevention section to promote pandemic prevention measures in response to the outbreak of the COVID-19 pandemic. Moreover, the university provides health care for those who have been tracked and put under surveillance.

The Health Division provides teachers and students with health consultation and excellent healthcare equipment (such as InBody, a body composition analysis device and so on). It has set up the Food Hygiene and Health section and organizes campus health promotion activities to promote health concepts. Additionally, AEDs (automated external defibrillators) have been set up to make sure they are accessible within five minutes. A total of 33 AEDs have been set up on NKUST's five campuses. Moreover, NKUST has 36 contracted hospitals and medical institutions covering the department of internal medicine, the surgical department, the obstetrics and gynecology department, the ophthalmology department, the dental department, the department of Chinese medicine and so on to provide the teachers and students with comprehensive health services.

The Student Counseling Division of the Office of Student Affairs regularly provides a DIY mood check and monthly counseling magazine. In addition to establishing the counseling reservation system, the Student Counseling Division has been approved by the authorities to carry out tele-psychological counseling so that NKUST's students can access the resources anytime they need. All aforementioned measures help the students maximize their education and provide health and well-being on campus. Moreover, NKUST has commissioned the Office of Counseling to provide psychological counseling services for faculty and staff and gives each person a three-hour subsidy every academic year, which shows that NKUST cares about the physical and mental health of its faculty and staff as much as students'.



NKUST has **36** contracted hospitals and medical institutions covering the department of internal medicine, the surgical department, the obstetrics and gynecology department, the ophthalmology department, the dental department, the department of Chinese medicine and so on to provide the teachers and students with comprehensive health services.



2.1.7 Barrier-free Spaces

The present school buildings of NKUST on Jiangong Campus, Nanzih Campus, and Cijin Campus are mostly old buildings with over thirty years of history. It is quite difficult to renovate these campus buildings into an accessible barrier-free environment due to the restrictions of architectural space. Additionally, some buildings on the First Campus are restricted to the laws and regulations regarding the accessible barrier-free environment and construction which were not thorough enough in the early days. Therefore, the accessible barrier-free equipment and standards of these buildings do not meet the needs of those nowadays. Moreover, these accessible barrier-free facilities need to be repaired and renovated due to their long history. Therefore, when building new buildings, NKUST abides by the latest laws and regulations to plan and set up accessible barrier-free facilities, and actively improves old buildings, making efforts to move towards the direction of constructing an accessible barrier-free campus.

To facilitate teachers and students with mobility issues to carry out studies, research, and academic exchange, NKUST continues to construct and provide a perfect learning and living environment. The university has renovated numerous school buildings and old equipment by investing expenditures in an effort to improve and replace old ones every year. The university has spent NT\$62.95 million on the promotion of an accessible barrier-free environment and received the subsidy of approximately NT\$32.21 million from the Ministry of Education since 2007.

In 2021, NKUST invested over NT\$12 million to complete accessible barrier-free elevators outside a newly built building of the Department of Mechanical Engineering and accessible barrier-free restrooms on the first floor of the department's building on Jiangong Campus. The stairs from the first to the second floor at the north wing of the stage have been equipped with a powered stairway chair lift. Additionally, accessible barrier-free facilities in Huanyu Building on Nanzih Campus have been improved, including parking space (signals), paths leading outdoors, entrances and exits on the emergency evacuation level, ramps, and rails. In the future, NKUST plans on improving a total of 24 toilets and renovating 6 accessible barrier-free toilets on Jiangong Campus, Nanzih Campus and the First Campus. The total expenditures of the construction and renovation will be approximately NT\$24.6 million. Additionally, the university will actively examine and review the accessible

barrier-free environment on Jiangong Campus and Yanchao Campus and gradually expand or improve the environment in accordance with relevant laws and decrees. Moreover, the university plans on the feasibility of installing accessible barrier-free elevators in the Administration Building on Cijin Campus. The same year in October, the overpass of the Art and Culture Center on Jiangong Campus was completed, demonstrating how a new accessible barrier-free design could be adapted to an old building. The overpass has integrated with the original elevator to increase the accessibility of space use as well as to increase the utilization rate of space and facilities, making actual space design reach the user-friendly goal.

After accessible barrier-free facilities (equipment) at NKUST are gradually improved or expanded, they become accessible to teachers and students for their daily use. Additionally, they provide a more complete learning environment and living space to meet the learning needs of teachers and students with mobility issues. The renewal of elevators not only enhances comfort, beauty, reliability and safety, but also saves regular repair and maintenance fees, lowering the waste of social resources.

2.1.8 Occupational Safety and Health

The campus is a learning venue. Additionally, it is an important location where faculty and staff work every day for a long time. Therefore, in order to protect the safety and health of the university's faculty and staff, NKUST has formulated, planned, and

promoted the management plan of occupational safety and health to clarify the division of responsibilities for each unit. Moreover, the university implements and executes the operations of occupational safety and health as scheduled.

In 2021, two cases of temporary total disability excluding traffic accidents going to work and getting off work happened, and there was no case of occupational disease. The annual total person-work hours were 7,223,868 hours. In accordance with the statistical indicator of disabling injuries stipulated by the Ministry of Labor, the disabling frequency rate (FR) per one million man hours worked is 0.28, the disabling injury severity rate (SR) per one million man hours worked is 8.17, and the occupational disease rate (ODR) is 0.00. This shows that the working environment and equipment make a safe occupational venue due to the university's staff work hard and strongly abiding by rules and regulations.

NKUST has formulated guidelines for the implementation of physical and health check-ups. The university organizes physical check-ups for newly recruited employees and in-service health examinations on a regular basis. Additionally, the university monitors the working environment which harms the health of operators and arranges special health examinations for employees. The university employs occupational medical doctors to provide health services on-site on every campus in turn every month and give instructions for improving the results of employees' health examinations to perfect health management at the university.



2.2 Implementation of Campus Sustainability

2.2.1 Activities Related to Campus Sustainability

Implementation of Campus Sustainability

Since the merger of the three universities, NKUST has integrated the three features of “strong connections with industries,” “innovation and entrepreneurship” and “marine technology” to invite and cultivate professional and outstanding technical talents, as well as develop the excellent features and potentials of diversified cultures, cross-field collaboration, and social inclusion. By matching the needs of the national political, economic, and cultural infrastructure, NKUST has undertaken many government projects at all levels. Meanwhile, with its expertise in the field of teaching and research practice, the university has assisted the government in formulating policies and solving social problems several times. In 2021, NKUST faculty and staff undertook a total of 120 government projects. Among which, 71 of them were related to sustainability, nearly six times the number of projects undertaken in 2020. In the future, NKUST will continue to further the integration of cross-school resources, encourage the active participation of faculty and staff in sustainability research projects, and assist the government in promoting sustainable development policies.

In the 2020 academic year, in line with the implementation of the “Project on an Issue-oriented Approach to Narrative Competence Development Across Disciplines” organized by the Ministry of Education, NKUST’s College of General Education developed the course module with sustainability by offering the two course groups of degree programs of “Smart Urban/Rural Placemaking” and “Sustainable Marine Development.” The arrangement of combining general education with courses at departments helps urge students to care about the issue of sustainable development.



Smart Urban/Rural Placemaking
Fengshan District

The “Smart Urban/Rural Placemaking” course grouping chiefly guided students in visiting Fengshan District, a historic city district in Kaohsiung County. The content of the courses is as follows:

General Chinese Coursework

Teachers guided students to learn more about local folklore, history, and culture hidden in Fengshan communities by visiting Fengshan District. Additionally, students were inspired by writing fables incorporating local folk customs and drawing characters for their stories, compiling a picture book and pamphlet with both excellent pictures and literary compositions following a visit to ancient city sites.

Introduction to Design

Through field trips and guided tours, students gained a deep understanding of the features of the Chishan Settlement and the history and culture of the Fenggang Community in Fengshan District. Students marketed Fengshan District and beautified the place to achieve the goal of sustainable development. Additionally, their designs could be found on transformer boxes and manhole covers which were presented with creative models incorporating the features of local temples, rice cultivation, and traditional crafts to show the Fengshan’s rich atmosphere on public infrastructure.

Exploration of Local Culture

During their field trip, students were led to visit stores incorporating traditional culture, historic sites, and temples that acted as the religious center of residents. It helped students form landscapes and special imagery of Fengshan District in their minds. Additionally, teachers instructed students with the board game map to bring their creativity into full play to make a board game map using the imagery of Fengshan. Moreover, they included essay questions about local history to make the board game not only interesting, but also educational.

Multimedia System

On field trips, students absorbed knowledge about local history from guided tours and recorded the panoramic views to be presented on the scenes of games. Students elaborated their creativity by designing the levels of their games with historical knowledge to make a multimedia tool for touring Fengshan District using both recreational and educational meaning.



◀ The guide map of historic city of Fengshan drawn by students from CCI at NKUST



Smart Urban/Rural
Placemaking

Story Creation and Copy Design

During a field trip, students were guided to visit stores or tourist attractions in Fengshan District that had cultural and artistic styles or historic value. Additionally, they were encouraged to interview locals or survey these places and introduce each of these places through writing. Moreover, students were asked to design and plan a series of sightseeing routes, compiling each route into a travel guidebook to help tourists who visit Fengshan District for the first time so they could enjoy a knowledgeable trip.

Environmental Resources and Conservation

Students visited the Fengshan River, Cao Gong Canal and other natural spots in Fengshan District in the course. Additionally, guided tours were arranged to introduce the hydrology of the rivers and geological conditions in Fengshan District. The course also showed students how the environment had been damaged over the past. Students' compassion for the environment was inspired by visiting Nature in person. Moreover, they thought of solutions for environmental issues when designing the board game which could help raise people's awareness of environmental protection.

Brand and Innovation Management

The course taught students how to help transform traditional crafts stores in Fengshan District which were likely to go out of business. Therefore, students mainly visited these old stores which had been born to meet the daily needs of residents in the early days. However, due to population exodus and aging, their businesses dwindled and could not be passed on. During the field trip, students learned more about the local traditional stores, and interviewed store owners. After communicating with these store owners, students designed marketing proposals that were in line with the store owners' philosophies and gave them suggestions on the transformation of traditional industries.

Taiwan's Historic Sites and History

The field trip for this course took place at the ROC Navy's Mingde Training Class (formerly known as Japanese Navy Fengshan Communication Center) which is a preserved military installation. Students were arranged to visit each old building to substantially learn about their historic backgrounds and uses. To help students familiarize themselves with the features of the historic site, students made models of the historic site by imitating each of its buildings. After growing familiar with the buildings, teachers guided students in designing an online puzzle involving the historic site. The game shows the time and space of the historic site as it existed through different eras. The historical facts recorded in documents serve as different levels of the game. The game not only markets a historic site that has declined, but also makes good use of unoccupied space.

Social Change and Rule of Law

Students visited the temple, historic sites, and traditional crafts stores which have kept local residents company for many years in the Fenggang Community. Students could see the change of the times, the division of the land and the urban planning policies by visiting temples with long history and living circles that used to be prosperous. However, the traces of villages from the early days were nowhere to be seen, which enabled students to think about how to preserve and promote historic traces. Teachers guided students in designing levels for their board games with their thoughts on the issue.



E-commerce

The course led students on a visit to the Fongyi Academy and Fongyi Barn, helping them discover the business opportunities of the Fenggang Community in Fengshan District while exploring the local tourist attractions. Additionally, they made cultural and creative products and new LINE stickers. Teachers taught students to enhance their marketing validity by learning to tell stories about their products on social media platforms. This not only promoted the local features of the Fengshan District, but also brought innovative ideas to its traditional culture.





In the course group of “Sustainable Marine Development,” students visited Yongan District and Cijin District, the coastal administrative districts of Kaohsiung to match up NKUST’s marine features. The content of the courses is as follows:

General Chinese at College

Students were asked to create their own works with drawings and words to let students express their feelings toward local scenery, write about their creation philosophy, and make a presentation in front of the class.

Overview of World Fishery

Based on the designated issue regarding fishery resources, the student teams designed an App to promote food and fishery education through interactive games. The importance of sustainable fishery could thus be promoted in the educational and recreational game.



◀ An exhibition model created by students from DMLM at NKUST

Guided Tours

After the field trip, students probed deeply into local documents and summarized, analyzed and discussed these documents. Additionally, they made a presentation on their creative travel proposals in class, and created a sightseeing brochure for local tourist attractions.

Application of Marine Materials

To increase economic value, students used their creativity to transform scales, fish bones and other useless parts of fish into processed products based on their characteristics. On the one hand, this helped strengthen students’ professional knowledge; on the other hand, it promoted the cycle and use of fishery resources.

Marine Myth Terminators

Centering on the subject of marine sustainability in Yongan District, students used their critical media literacy skills to make aquaculture information and food and fishery education for dummies to equip the public with correct fish-farming knowledge.

Planning and Designing Marine Activities and Celebrations

Students were taught to be equipped with the abilities of writing proposal formats in class. After having an understanding of festivals and celebrations held in the venue, they organized problems that these events might encounter, and re-proposed their creative ideas of marine activities and celebrations. They narrated their ideas with images, and presented their proposals of celebration design with digital media.

Practical Writing

Students were taught to write proposals on sightseeing activities centering on the subject of “Marketing Yongan.” Additionally, they were taught to do practical writing.

Oceanography

The experiential course took students on a field trip to deepen students’ professional knowledge of coastal terrain. Additionally, students were divided into groups to discuss lesson plans for popular marine science, passing down difficult knowledge to the public.

Marine Ecology

Students conducted beach clean-up while visiting the venue. Facing the real problems of the venue trained students to think about effective actions to protect the ocean. Students turned waste found on the beach into the works of art, and illustrated their creation philosophy, presenting the impact of ecological calamity on the ocean caused by garbage pollution.



Marketing Management

To market Cijin Peninsula, students acquired the theory of marketing management during a field trip. After gaining an understanding of the unique cultural and historic background of the Cijin District, students reversed the old sightseeing images of the district to make more diverse sightseeing plans, propagating looks which are unknown to people.

Marine Tourism

The course probed into and analyzed difficulties that the venue faced in the tourism industry. Students applied professional knowledge that they had acquired in class to plan feasible and appropriate marine recreational activities, and made their proposals with briefing.

Introduction to Convention and Exhibition Industry

Students learned to plan conventions and exhibitions, and integrated tourism development potential in the venue to design diversified exhibition models to increase the exposure of tourism resources in Cijin Peninsula.

Issue Exploration

After learning about the sustainable development goals (SDGs) of the United Nations, students explored in the venue to verify the surroundings. The experiential course enabled students to realize harm caused by environmental degradation, further guiding students the future prospect of ocean sustainability in the hope of solving problems that have damaged the ocean.

The two course groups guided students to learn more about issues by learning scenarios at actual venues, and to show results with practical methods. Compared with being lectured in the classroom, students had the opportunity to experience local cultures by exploring at venues, and to comprehend social issues that a region was facing such as the decline of the tourism industry, and young people leaving their hometowns. Being instructed by the teachers in the classroom, students tried to solve these local problems. These courses raised students' awareness to shoulder the responsibility of peace and sustainable development that a global citizen has to bear. Additionally, the courses hoped to flip the concept of domination of single professional subjects in the traditional classroom at college. Instead, they resorted to the flipped courses of "concerning about local needs and real problems in the world." Students comprehended local needs by field trips, and they proposed their solutions to these local problems by integrating their awareness of these problems and their professional knowledge in different fields. Teachers and students at NKUST cooperated to examine a variety of problems that the world is facing, and develop innovative solutions with knowledge and skills acquired at NKUST and with local organizations or people.



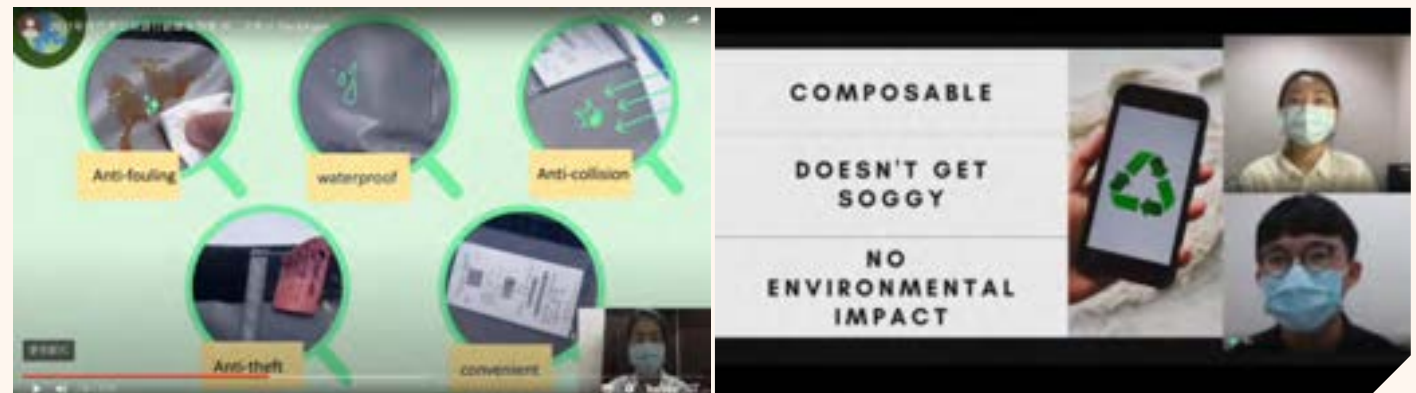
English Marketing Briefing Contest for Green Products

The annual English Marketing Briefing Contest for Green Products was held in early June 2021. Featuring “green environmentally friendly commodities,” the contest integrated 17 sustainable development goals (SDGs) announced by the United Nations to encourage students to solve social and environmental issues with the business models of green products by the method of marketing briefing, and to use more green products in their daily lives.

Due to the continuous impacts of the COVID-19 pandemic, the contest was held online in 2021. However, students still participated in the contest enthusiastically. A total of 46 students formed 15 groups that participated in the contest. They were from the undergraduate and graduate programs of NKUST. Moreover, the topics and content of this contest were diverse, such as sugar cane straw, package+, sustainable shoes, and other topics. This contest helped students discover that there were actually numerous green commodities in life, further connecting their sustainable development philosophy with their lives more closely.

Meanwhile, students had a better understanding of green issues and products. They expounded their ideas clearly while comprehending knowledge and the importance of green issues and products. Moreover, while cultivating their English marketing abilities, students extended their thoughts of products, acquiring marketing knowledge.

☑ Sessions and number of participants for sustainability activities in 2021

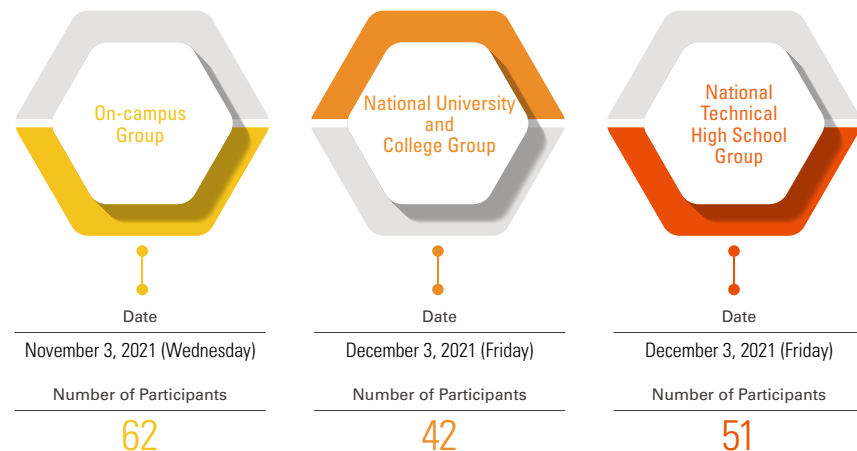


▲ Participants in English marketing contest for green products are giving a brief

United Nations Sustainable Development Goals (SDGs) Youth Initiative English Proposal Contest

Over the past few years, NKUST's undergraduate programs have started integrating the lesson plans of SDG courses in the hope of guiding students to comprehend the importance of the SDGs, and to think of important sustainable development issues from both a local and global perspective. At present, college students have the primary understanding of SDGs, but they still have a long way to go before they put the SDGs into action. In view of this, the Department of Applied English of NKUST holds the "United Nations Sustainable Development Goals (SDGs) Youth Initiative English Proposal Contest," and this year marked the third year of the contest. In 2021, the department organized the three major sessions of On-campus Group, National University and College Group, and National Technical High School Group, with 155 students forming 48 groups that participated in the contest. In addition to students from the Department of Applied English, students from non-English departments such as the Department of Tourism Management and the Department of Business Management also took part. Moreover, foreign students from Japan, Vietnam, Mongolia, Sri Lanka, and Indonesia teamed up to sign up for the contest. The proposals in this contest were diverse, including those on ocean pollution, cleaning up the environment, the reuse of water resources, climate change, carbon reduction and environmental protection, plastic reduction, zero hunger, anti-food waste, gender equality, smart health care, educational resources, child labor, saving Taiwan's mother tongues, responsible production and consumption, and other issues. The contest showed how young people and students are concerned about and engaged in global sustainability.

☑ Forms for number of participants for each session of SDGs Youth Initiative English Proposal Contest



In 2021, NKUST held **39** sustainability activities on campus, **23** ones off campus, with a total of **3,372** participants.

For more information about NKUST's sustainability results, please refer to [NKUST's Commitment to Sustainability website](#).



NKUST's Commitment
to Sustainability website



▲ National SDGs Contest (University and College Group)



▲ National Technical High School Contest



▲ National University and College Group
award winners



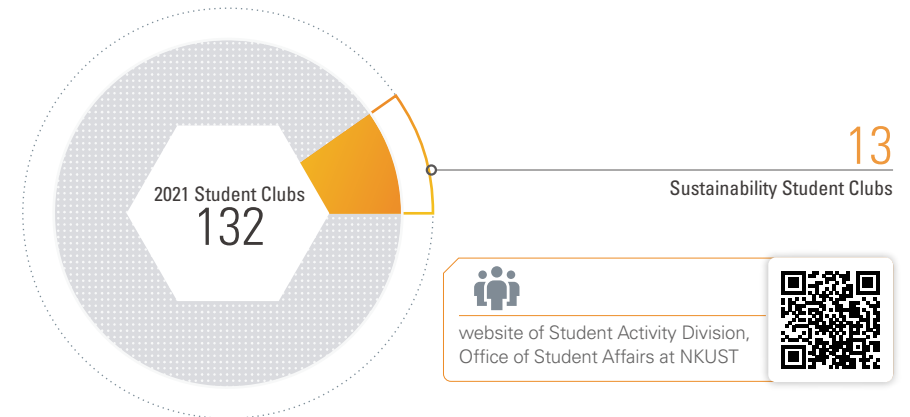
▲ National Technical High School Group
award winners

2.2.2 Sustainability Student Clubs

In 2021, there were a total of 132 active student clubs on the campus of NKUST, with a great diversity of academic, recreational, physical and service clubs. In 2021, the amount of club subsidies also increased steadily compared with the previous period, with a total of NT\$3.8 million.

At present, NKUST has 13 sustainability student clubs which uphold their founding philosophy to keep promoting sustainable development activities such as Animal Protection Club, Culture Services of Young Grass Roots, NKUST Diving Blue and so on. Take “NKUST Diving Blue” for example, the goal and purpose of the club is “to promote water activities and maintain marine environment.” Therefore, the club has held numerous beach and ocean clean-up activities. With respect to social service, it promotes ocean conservation concepts and advocates water safety at schools in line with the Ministry of Education. Over the past few years, the club has won the Award of Excellence at National College Students’ Selection several times, of which the university feels worthy of having received the honor. The club’s activity photos are as follows.

For more information about student clubs, please visit the [website of Student Activity Division, Office of Student Affairs at NKUST](#).



▲ Club activities of NKUST Diving Blue



Bicycle maintenance project



In 2021, NKUST dispatched its social service team **117** times, with **523** students participating in the social service, and **569** people being served.

2.2.3 Service Learning and Rural Service

When it comes to service education, everyone thinks of the changeless task of cleaning up the campus. To integrate the spirit of service learning with life, NKUST has offered “professional service education” and “social service education” in planning the courses of service education to enable students to press close to society while serving others, reflecting upon more assistance that they can provide for their surroundings.

“Professional service education” refers to courses that incorporate the philosophy of professional education service of academic units, urging students to shape and develop their abilities to help others while applying acquired knowledge. For example, students have to learn to steer drones to patrol rivers and regularly record water quality data. In 2021, over 200 students conducted smart patrols with drones 18 times, which enabled students to experience and learn more about each field of environmental safety and to connect with the university’s conceptualization of social responsibility. Additionally, the area of the First Campus is rather large, and there was high frequency for the use of courtesy bicycles. Therefore, the teachers of the Department of Mechatronics Engineering instructed their students to participate in the bicycle maintenance project based on their interest and expertise. In 2022, a total of 193 students participated in the project to repair, improve, and maintain

public bicycles on campus. For example, they added taillights, signal lights, and warning bells to the bicycles to enhance biking safety for students. Moreover, a basic training course on the design and theory of frames and wearables, a brief introduction and manufacturing of bicycle structures, and the repair and maintenance of a bicycle equipped students with basic repair abilities for campus bicycles and inspired students to pay attention to societal needs to bring their passion for social service into full play, matching their knowledge with skills.

“Social service education” encourages students to search for institutions in need themselves or serve children from disadvantaged families, and the subjects of non-profit organizations and public service organizations. Institutions that cooperated with NKUST included Huayuan Children’s Service Center, Huashan Social Welfare Foundation, and Warmer Social Welfare Foundation. In 2021, NKUST dispatched students to these three organizations 32 times each. It was hoped that students could reflect upon themselves in serving children from disadvantaged families, senior citizens living alone, and disadvantaged elders. Meanwhile, the social service education deepened students’ good will towards serving and caring for others, and helped them bear the responsibility of giving back to society, putting the true meaning of service learning into practice.



▲ Social service education and learning

2.3 International Exchanges

Number and Distribution of Sister Colleges

Up until the end of 2021, NKUST had 453 sister colleges across six continents around the world, mainly situated in Asia and Europe. So as to develop sustainable cooperation, NKUST will continue to deepen its relations with sister colleges and create transnational industry-academia collaboration and transnational exchange opportunities for teachers and students to promote substantial exchange to stabilize the foundation of sustainable management.

2.3.1 Planning and Promotion of Alliances with Universities Abroad

NKUST has participated in 6 important alliances by formulating concrete cooperation strategies with other outstanding international schools and educational institutions to benefit one another, fortify international partnership, elevate the schools' images and competitive advantages, and build an international network that interacts tightly. In 2021, NKUST actively managed and participated in HAWtech-TAltech²² and the Taiwan-Japan Alliance of Local Revitalization and Social Practice (hereinafter called the Taiwan-Japan Alliance). Additionally, NKUST allied with excellent institutes and colleges of technology in France to build inter-school interaction and contact in the field of scientific research to further the study exchange of students of institutes of technology, and increase their internship opportunities through the bilateral exchange meeting with Foundation for International Cooperation in Higher Education of Taiwan and the Bureau Français de Taipei. The following is a brief introduction of HAWtech-TAltech and the Taiwan-Japan Alliance which interact more closely with Taiwan.

22. HAWtech-TAltech: The alliance is composed of HAWtech formed by 6 universities of science and technology in Germany, including Darmstadt University of Applied Sciences (Hochschule Darmstadt), Karlsruhe Institute of Technology (Karlsruher Institut für Technologie), Esslingen University of Applied Sciences (Hochschule Esslingen), University of Applied Sciences Dresden (Hochschule für Technik und Wirtschaft Dresden; HTW Dresden), Aachen University of Applied Sciences (FH Aachen), and Berlin University of Applied Sciences (SRH Hochschule Berlin), and TAltech formed by 6 universities of science and technology in Taiwan, including National Taiwan University of Science and Technology, National Taipei University of Technology, National Chin-Yi University of Technology, National Yunlin University of Science and Technology, National Formosa University and NKUST.



HAWtech-TAltech

HAWtech-TAltech signed a bilateral exchange agreement in 2017 to connect with the alliance system of universities of science and technology in both Taiwan and Germany to promote the five major items of Exchange Students, Internship at Enterprises, Internship at School, Summer School and Visiting Tour.

NKUST served as the chairman on duty of TAltech between 2021 and 2022 and was in charge of organizing events for Taiwan's schools and served as an exchange window for both parties. Due to the COVID-19 pandemic, the HAWtech-TAltech Roundtable Agenda was held online between June 9 and 11, 2021. A total of 12 schools from both parties had numerous online meetings to discuss academic specialties, exchanges between faculty and staff, student exchange programs, short-term camps for students, and other items that continue to be operated, and the directions of cooperation and development in the future. During the agenda, a Taiwan-Germany education fair held online invited teachers and students of the 12 allied schools to participate in. Through the education fair, teachers and students could learn more information about the resources of other allied schools and interact with others online.

In November that year, NKUST was invited to attend a "Meet your partners! Virtual Teaching Collaboration!" orientation for the cooperation and development of digital teaching and promotion project, organized by Karlsruhe University of Applied Science, a member school of HAWtech. The meeting matched the Center for Innovation and Entrepreneurship Education and the College of Engineering of NKUST with the College of Economics at HKA to conduct transnational co-learning and co-instruction courses.



▲ Taiwan-Japan Alliance of Local Revitalization and Social Practice signing ceremony

Taiwan-Japan Alliance

The Center of University Social Responsibility of the Ministry of Education and the Office of Humanity Innovation and Social Practice Projects of the Ministry of Science and Technology established its "Provisional Office for Taiwan-Japan University Alliance" in 2019. The core members of the provisional office included NKUST and five other universities in Taiwan, and four universities in Japan. Upon two years of preparation, the "Taiwan-Japan Alliance of Local Revitalization and Social Practice (Taiwan-Japan Alliance)" was officially established in November 2021, and it is a platform used to promote the exchange of experiences in social practices between universities in Taiwan and Japan. It aims to construct a many-to-many exchange network to exchange the resources of both parties which serve as the key actors to respond to local issues through practice-based work combined with teaching and research, becoming energy to foster placemaking.

NKUST actively participates in the annual projects of the alliance, including e-papers, practice workshops, seminars, internships at communities/enterprises, and relevant activities. Additionally, the university encourages its departments and graduate institutes to promote transnational cooperation, invites professors from allied schools to give lectures and hold international seminars. Two online transnational practice workshops were held in 2021. Moreover, the Institute of Marine Affairs and Business Management of NKUST will offer transnational co-learning and co-instruction courses with Kochi University and Chiba University in the 2022 academic year.

2.3.2 Planning and Promotion of International Industry-Academia Collaboration

The Office of Industry-Academia Cooperation of NKUST roots deeply in innovative application and research derived from the university's forwarding techniques and specialized fields, connections with industries, resource integration, industry-academia collaboration, technique transfer, patents, internships, and talent cultivation. Meanwhile, the office has built up its mode of inter-school cooperation and international connections. In 2021, the office signed 16 international industry-academia projects, with a total of NT\$7,008,127 in contract signing fees. The signatories included Austria, the United States, Germany, the United Kingdom, Vietnam, and Spain.

In addition to actively researching and developing techniques with international enterprises, NKUST has been involved in industry-academia collaboration to cultivate international talents. At present, NKUST continues to promote the Taiwan-Singapore joint course on semiconductor with FablessHR²³, and the two parties have signed the letter of intent to enable two instructors home and abroad to teach the course, teaching students the theoretical foundation of the subject required by the industry. Additionally, along with the practical experience of international industry masters, the course module on international industry training is offered. The philosophy and model of the course is briefly described as follows.

Building an international learning schedule that matches knowledge with skills

In response to the structure of international labor shortage, the subjects, training and experimental courses of training for occupational skills must be made in line with the demand of the market and the property of industries. Additionally, they should be customized to meet the learning schedule of students to cultivate within them with knowledge and skills for occupations and to minimize the gap between knowledge and skills.

Constructing new careers with a strong mentality

The introduction of instructors helps make up for the deficiencies in occupational literacy and skill training. Meanwhile, they cultivate students' discipline, endurance and stamina, and the logic of industrial thinking, which are mentality, thought, and logic that a sound industrial talent should possess.



Constructing competency-oriented international industrial talents

The human resources market is now facing an international labor shortage and insufficient training for occupational skills. However, students graduating from the formal educational system cannot make up for the labor shortage and talents required by industries. To solve the problems and respond to the trends of international industries, NKUST has planned precise training for occupational skills to help make up for the deficiency.

Building a rapid and convenient transnational new model

The industry-oriented occupational skill training in the world lacks intensive and rapid key courses. Therefore, NKUST replaces traditional in-person classes with online education to enable participants to promptly obtain training opportunities in spite of uncertainties during the COVID-19 pandemic. The entire courses are videotaped to turn students' in-class performance into concrete data which serves as information for the human resources department of international industries to refer to when they recruit the students in the future. Moreover, instructors for these courses are mostly industrial representatives who help students acquire the latest knowledge and techniques in compliance with industry trends.

In addition to the aforementioned "international industrial training module course," NKUST, responding to the university's features in maritime fields and to connect with community and industrial transformation that local fishing villages face, cooperated with its Japanese sister colleges of Kagoshima University, Kochi University and Chiba University from the Taiwan-Japan Alliance in Japan, holding a "Social Practice Proposal Contest for Good Fish Next Door Project—Caring for Remote Townships and the Disadvantaged." The subjects of the contest included college students from Taiwan and Japan. The proposals had to be creative. Additionally, participants were asked to work at a selected spot to put their creativity into practice, actually observing if the problem that a remote township had faced could be solved with their creative proposals. The event was put on the news of the College of Regional Cooperation of Kochi University, and went viral. In addition to receiving sponsorship from Taiwan's green energy companies, NKUST, by using the revenue appropriation and feedback mechanism from the project, encouraged Taiwan's consumers to buy products at stores working in conjunction with the Good Fish Next Door Project to support seafood and aquatic products from friendly fish-farming so that 5% of revenue could be appropriated to remote townships via the platform, helping them retain growth, and further creating a good hometown environment for young people to return to. This project not only strengthened the sales channels and volume of environmentally friendly aquatic products, but also helped small fishing businesses in Linbian Township and Jiadong Township, Pingtung to grow steadily in the new business model. NKUST has genuinely realized the sustainable development locally.

²³ FablessHR is an online manpower recruitment platform for semiconductor, and it assists the semiconductor industry to collect the information of job seekers, and to select and recruit new employees.

The website of Good Fish Next Door Project ▶





International Culture Experience Camp on Siaoliuciou Island on January 25, 2021

In the 2020 academic year, NKUST established an international volunteer team.

Additionally, the team held 4 events for that academic year, with a total of 150 participants.

2.3.3 International Exchange Statistics

◆ Exchange Student and Dual Degree Programs (including studying abroad and coming to NKUST)

In regards to international exchange learning and dual degree programs, due to border controls under the COVID-19 pandemic, the exchange students of NKUST's sister colleges were not allowed to enter Taiwan except for exchange students on special projects and foreign students pursuing academic degrees in Taiwan whose entry was approved by the Ministry of Education.

In the 2020 academic year, one exchange student (who received an MOE Taiwan scholarship) studied at NKUST, and 25 students pursued dual degree programs at the university. With respect to studying abroad, as some courses of NKUST's sister colleges were put online, six students actually studied abroad as exchange students, four students received exchange courses online, three students actually pursued dual degree programs abroad, and three others pursued dual degree programs in the distance learning mode. Upon evaluation, students could opt for deferred admissions abroad.

◆ NKUST's Students Studying Abroad

With the goal of spurring students' motivation for international participation and learning, NKUST holds an international education fair, organizes international seminars on a regular basis and makes incentives. Additionally, the university has pioneered diversified international exchange opportunities, including exchange programs

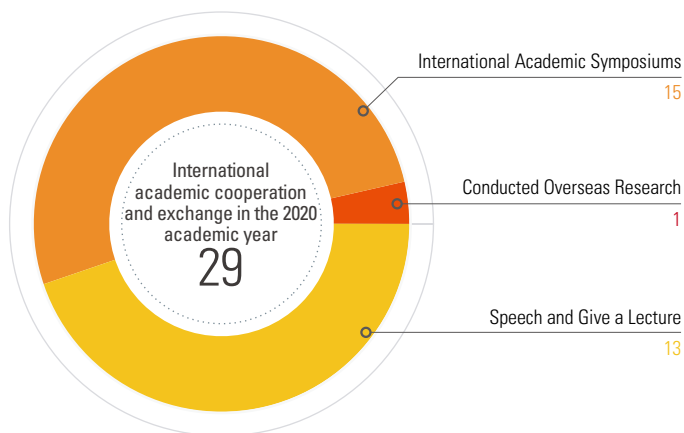
abroad, dual degree programs, short-term study, overseas English camps, international volunteers, internship abroad, teaching demonstrations, thesis publication abroad and international contests. NKUST encourages students to study abroad to broaden their international horizons. Due to the COVID-19 pandemic, most overseas short-term study plans and international academic seminars were held online. In the 2020 academic year, a total of 188 students participated in international learning.

NKUST's overseas internship programs included the internship opportunities of different aspects. Between 2018 and 2021, NKUST successfully matched 497 students to overseas internships. However, due to the overseas outbreak of the COVID-19 pandemic, the number of students who actually completed internships were fewer than the number of successfully matches, with a total of 447 students. Students primarily engaged in internships in China and Japan. Although the pandemic had a great impact on people's life, NKUST's Office of International Affairs still held overseas internship experience sharing events, taught students to write their English resumes and interviews, organized overseas career seminars, and asked enterprise supervisors to share overseas job seeking cases to help students smoothly participate in an internship after the pandemic ends.

Since 2017, NKUST has organized its SOAR Overseas English

Summer Camp to cultivate students with international communication abilities with immersive teaching and cultural experience activities by studying abroad, with a total of 257 students studying abroad. However, in response to the pandemic prevention policy, SOAR English Camp was held domestically in Taiwan. Foreign Language Education Center of NKUST cooperated with four sister colleges in the Philippines, and between 2020 and 2021, a total of 137 students participated in the camp. Although they could not study abroad, they still get ready for their future!

NKUST hopes that students will love to serve society while in college. International volunteer service is a good way to inspire students' responsibility for international society, enabling young people to execute the obligation of a world citizen, and to build their sense of mission for the future development of the world. The diversified culture service team composed of overseas students and Taiwanese students chiefly go to Indonesia, Cambodia, Thailand, and the Philippines. In the 2020 academic year, NKUST established an international volunteer team. Although the team could not go abroad due to the pandemic, they still viewed Taiwan as the starting point of their volunteer service and organized international cultural experience camps in elementary schools, junior high schools, and high schools in remote townships. Additionally, the team held four events for that academic year, with a total of 150 participants.



With the great support of NKUST, university's teachers actively travelled abroad to pursue further study, carry out research, give lectures, visit schools, and attend academic symposiums. Meanwhile, NKUST also encouraged the teachers to instruct graduate students and publish their research papers with international scholars to elevate the exposure of international research. With the endeavors of NKUST, teachers and students, a total of 29 teachers participated in international academic cooperation and exchange in the 2020 academic year. Among which, 15 teachers attended international academic symposiums, 13 of them were invited to deliver a speech and give a lecture, and the other one conducted overseas research in Florida, America.

◆ International Learning E-Passport

To urge NKUST's students to actively participate in various international learning activities, NKUST inculcates students with the four international core competencies of "communication," "adaptability," "professionalism" and "practicality." Since 2021, NKUST has promoted the international learning e-passport. The learning authentication mechanism of the passport records the international learning activities, international learning trajectories, and participation preferences of students throughout their time in university, and analyzes their international core competencies to further comprehend their international learning outcomes. A total of 686 students have registered and used the e-passport system since its online debut on April 1, 2021.

◆ Visits of Overseas Scholars and Students

To make the university's campuses international, NKUST promoted international camps with the features of different departments. The courses of the camps incorporated professional fields with cultural experience activities. In addition to providing foreign students with diversified study channels that foster their academic literacy, the camps also gave Taiwanese students the opportunity to interact with foreign students, expanding their international outlook through cross-cultural exchange.

NKUST encourages departments and graduate institutes to invite foreign scholars to give lectures, visit one another's schools, and collaborate on research. Additionally, foreign scholars are welcome to offer micro-credit courses and deliver speeches. In recent years, due to the COVID-19 pandemic, students did not have many opportunities to study abroad. To make up for the deficiency, a total of 14 departments and graduate institutes tried holding online courses in the 2020 academic year and invited 42 overseas scholars to give lectures, deliver speeches and conduct

international academic cooperation for a short period of time. Due to the pandemic, teams could not study in Taiwan in person. However, to fortify exchange with its sister colleges around the world, NKUST still held online activities actively. On November 30, 2021, NKUST held the international online workshop for the PBL (problem-based learning) course, and a total of 39 students from Shizuoka Institute of Science and Technology, Japan, and from NKUST's Department of Mold and Die Engineering, Department of Electrical Engineering, Department of Mechatronics Engineering, Department of Information Management, Department of Shipping and Transportation Management, and Cross College Elite Tech Program. The online courses and activities and the academic exchange of inviting overseas scholars to give lectures in Taiwan for a short period of time enabled students who did not have the opportunity to study abroad to experience international learning, and created diversified cooperation with NKUST's sister colleges while enhancing the university's international visibility.



▲ NKUST international learning e-passport



2.3.4 Exchange of International Students and Taiwanese Students

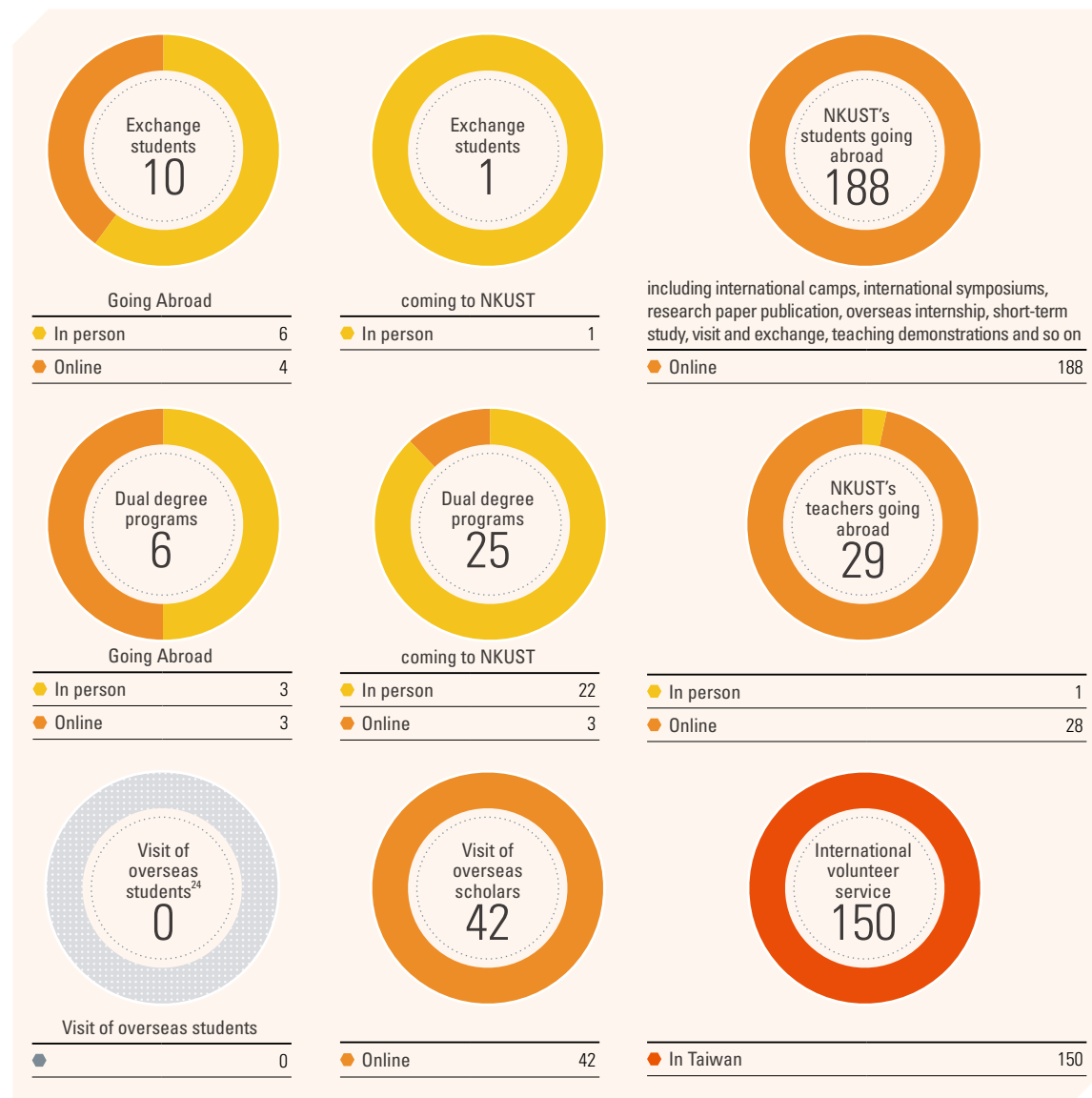
To encourage international students to exchange with Taiwanese students, NKUST held numerous cross-cultural activities in 2021, including services for Liuchiu Elementary School and Jia Dong Junior High School in Pingtung arranged by International Volunteer Club, the Small Hand in Big Hand event co-hosted with National Min Shyong Vocational High School of Agriculture and Industry, the Vietnam Cultural Festival, and other service, culture and food experience activities. Taiwanese students, including NKUST's students and students from other schools took the chance to have a better understanding of foreign cultures and to give international students the opportunity to have in-depth exchange with Taiwanese students, explore cultural differences, and foster the cultural integration on campus.

2.3.5 Overseas Experience Learning Program

In facing globalization, it is indispensable to cultivate students with cross-cultural and global mobility abilities in order to stand firmly on the international competition stage. Since the promotion of the Overseas Experience Learning Program in the 2017 academic year, NKUST has integrated general education with systematic curricular design and problem-based learning methods. The main focus of the curriculum is the sustainable urban and rural development in Asian countries, and it profoundly explores and compares the important cross-cultural issues in Taiwan and other Asian countries. Additionally, the program guides students to plan their international experience learning proposals by themselves, and provides students with opportunities to carry out international participation and exploration in Asian countries.

Since the execution of the program in the 2017 academic year, NKUST has sent nearly 150 students to take a gap year. However, international mobility was temporarily deferred due to the COVID-19 pandemic, so NKUST cooperated with Center for the Liberal Arts to promote the Overseas Experience Learning Program to encourage students to make a gap year proposal through the method of self-directed learning. In the 2020 academic year, a total of 25 students participated in the program.

Statistics of international exchange in the 2020 academic year



24. In 2021, international mobility was temporarily suspended due to the COVID-19 pandemic, so the number of overseas students visiting NKUST was 0.



In 2021, NKUST signed 16 international industry-academia collaboration projects, with a total of NT\$7,008,127.

2.4 Resource Sharing

2.4.1 Cultural and Art Activities on Campus

The Arts Center of NKUST is dedicated to promoting beauty on campus, and manages the art and cultural exhibition space on Jiangong Campus, Nanzih Campus and Yanchao Campus to plan the cultural and art event of “Cheer Up” with a non-curricular mode, including 10 visual arts exhibitions, 23 performing art exhibitions and 14 handmade or body development and expression workshops, film festivals and seminars. The event is not only for NKUST’s teachers and students, but also for nearby schools and residents. An art and cultural brochure is first edited and printed before being distributed to the university’s teachers and students to campaign the event. In this past year, Arts Center actively put some activities online, gradually turning physical exhibitions into films and clips to enable more people to enjoy the beauty of art without any distance.

Furthermore, Arts Center organizes the “Youth Arts Award” each year to enhance NKUST’s students’ understanding of art and humanities, improve the faculty’s and students’ aesthetic vision and their abilities

to appreciate art, as well as creating an artistic vibe on campus. Meanwhile, Arts Center shoulders the social mission of artistic and aesthetic education. The open selection is to encourage young Taiwanese artists to show their creative capacity while increasing NKUST’s diversified cultures. In 2021, a total of 492 works participated in the “Youth Arts Award.” Among which, 1 won the Gold Medal Award, 20 won the Collection Award, and 20 won the Judges’ Award.

During 2021, NKUST made efforts to optimize the art and cultural venues on campus. The International Conference Hall on Nanzih Campus was renovated, and a reception desk was set up. Additionally, a lounge and bathrooms have been added for performers. Moreover, lights, videos, other stage equipment and echo boards were purchased to improve the functions of the venue, which have significantly enhanced the professional degree and diversity of the conference hall. NKUST hopes to invite more renowned groups to perform in the conference hall.

In 2021, NKUST invested NT\$ **27,978,756** in expenditures for art and culture.

In 2021, a total of **492** works participated in the “Youth Arts Award.” Among those, 1 won the Gold Medal Award, 20 won the Collection Award, and 20 won the Judges’ Award.



Third Youth
Arts Award
Ceremony



▲ Renovated International Conference Hall on Nanzih Campus



▲ Seminar on Social Meaning of Seals and their Connection with Contemporary Art



▲ Performance of the Four Seasons

2.4.2 Libraries

Libraries of NKUST are open to the faculty, staff, students, alumni, the family members of staff. Additionally, people with the presentation of a valid photo ID card may change it for a temporary library card before entering the libraries. To respond to the paperless policy to protect the environment, the public may enter their information via computer and receive their temporary library card upon the verification of the information desk personnel. The number of people allowed to change for a temporary library card is based on the size and features of each library on NKUST's campuses.

With respect to energy saving, the bookshelves on the third floor of the Library on Yanchao Campus have been installed with sensors. When they detect the movement of readers, lights will be on. Additionally, sensors are set up by windows, and lights turn on automatically when it gets dark to save energy. Moreover, a reclaimed water system has been set up on Yanchao Campus to effectively recycle and reuse toilet water to save water resources. Furthermore, solar panels have been installed on the rooftop of the Library and Information Building on Yanchao Campus, while solar panels are now being set up on the roof of the Library on Nanzih Campus. NKUST's libraries spare no effort to fulfill the

responsibility of sustainability no matter in energy saving, energy empowering or energy storing.

In regard to reader service, the faculty, staff and students may make a reservation to borrow books from the libraries of other campuses. Public service vehicles of NKUST deliver their books to designated campuses for them to claim so that they do not have to waste time commuting to other campuses. Additionally, this helps enhance traffic safety for the faculty, staff and students, and reduce carbon emissions produced by traffic. Moreover, every year, NKUST libraries subscribe or purchase databases and e-books for readers to read online, and hold promotional activities to encourage readers to make the most use of electronic resources. Library resources can be accessed at home or off campus. They are available anytime and anywhere as well. Meanwhile, readers can enjoy library resources of universities and colleges with diverse methods such as through the Nationwide Document Delivery System (NDDS), the inter-library borrowing-returning service and virtual library cards provided on the platform of Southern Library Resource Sharing Service, and the inter-library card which has been signed by numerous schools.

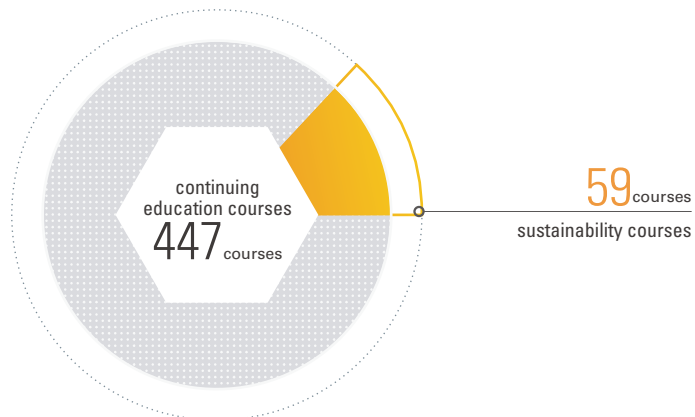
📊 Statistics of resources at NKUST's libraries

Type of Resources	Chinese	Foreign Languages	Total Volumes (Kinds)
Paper books	674,347	171,082	845,429
E-books	302,496	1,025,914	1,328,410
Paper journals	4,583	3,140	7,723
Bound journals	78,053	46,761	124,814
E-journals	10,697	40,316	51,013
Database	211	233	444
Non-book materials	72,834	17,916	90,750



2.4.3 Education Promotion and Brand Products

NKUST is dedicated to promoting lifelong learning courses. The university cooperates with the government to provide training programs, offering teaching and research resources to serve society. Therefore, NKUST has offered continuing education courses and training programs to provide faculty, staff, students and the general public learning opportunities and continuing education channels. The courses which have been designed to connect with the social trend include numerous sustainability courses such as training for indoor air quality maintenance and management personnel, the training program for professional technicians and management personnel of toxic chemical substances, the application of artificial intelligence on disaster prevention technologies, professional certification course for sustainable supply, smart IoT (Internet of Things), ecological engineering and so on. Additionally, NKUST continues to cooperate with Kaohsiung City Government to conduct the certification program for management personnel of pipeline excavation construction in Kaohsiung City, citizens' schools and so on to implement sustainable development and lifelong learning. In the 2020 academic year, NKUST offered 447 continuing education courses, with 3,952 people completing these courses. 59 courses of which were sustainability courses. These courses were offered in 63 auditing classes at the bachelor's degree program, 75 auditing classes at the master's degree program, 11 classes at the master's degree program (independent program), 71 non-credit classes, and 15 classes of Senior Citizens' Learning College. Among which, 2 classes were subsidized by the Ministry of Education.



In the 2020 academic year, **447** courses were offered for continuing education. Among which, **59** of them were sustainability courses. A total of **3,952** students completed these courses.

NKUST's Brand Stores

By upholding the philosophy of co-existence and mutual benefits, NKUST's brand stores sell products made with eco-friendly raw materials in the environmental-friendly process. These stores also sell cultural and creative souvenirs made with charity groups. NKUST elevates the altitude of the brands with diverse sustainability modes, achieving a win-win situation and sustainable development. Some special products researched and developed by NKUST's teachers are introduced briefly below.



Ugly Guava Popsicle

100% locally grown Yanchao guavas are used to make the natural Popsicle without artificial coloring and flavors. The guava Popsicle helps elevate the value of guavas 160 times.

Natural Goodies Series (Good Shrimp, Good Eel and Good Maw)

Probiotics is used to improve water quality, and bean dregs are made into feed for fish and shrimp. It is not easy for fish and shrimp to get sick in such an excellent environment, so no chemicals and antibiotics are required. As shown in the photo below:



Ocean Ranch Series (Fourfinger treadfin fish, hybrid tiger giant grouper; perch fillet)

The fish is bred with pure ocean water and low-medium intensity probiotics produced from fermented bean dregs, circular resources, to stabilize water quality, making the ecosystem in the pool stay balanced. It is eco-friendly fish-farming that does not press and poison the environment. As shown in the photo below:



Banana Flower Mask

By using bananas grown locally in Kaohsiung, banana flowers which are rich in anthocyanin are extracted to make masks.

Fruit Jam (green ponkan and golden diamond pineapple)

The fruit jam is a joint product of NKUST and Goodwill Foods. It is made with fresh ingredients in Taiwan. No antacid is used. Ponkan ripens naturally in the tree, and probiotic is used to prevent soil-borne diseases. Additionally, no plant hormone is used to grow golden diamond pineapples which ripen naturally in 530 days. The two kinds of fruit are used to make the 100% natural fruit jam without additives.

CHAPTER

3

Sustainable Contributions of Teachers and Students

3.1

Sustainability Research Projects and Papers

3.2

Research Papers on Open Access Journals

3.3

University Social Responsibility (USR) Projects

3.4

Sustainable Industry-Academia Collaboration Projects

3.5

Sustainability Projects with Government Agencies

3.6

Other Research and Cooperation Projects

3.1 Sustainability Research Projects and Papers

The global ecosystem has been influenced by climate change in recent years. Therefore, NKUST is dedicated to solving sustainability issues through sustainability research projects.

NKUST executed 283 research projects. Of which, a total of 194 projects were related to sustainability²⁵, accounting for approximately 68.6%. A total of 175 researchers were engaged in sustainability research projects. Additionally, a total of 844 research papers were published at NKUST, and among which, 162 papers were related to sustainability. The statistics of research projects and papers is as shown in the following Table. A total of 222 researchers were engaged in sustainability research projects or papers. There were 56 departments with at least one researcher engaged in sustainability research, accounting for 87.5% of all departments²⁶.

NKUST is formulating guidelines to encourage faculty and staff to be engaged in sustainability research. Newly added incentives are granted to research papers with keywords from the 17 SDGs of the United Nations in their titles, abstracts or keywords. NKUST hopes to urge its faculty and staff to place importance on sustainability issues, and elevate the university's sustainability research power by these incentives.

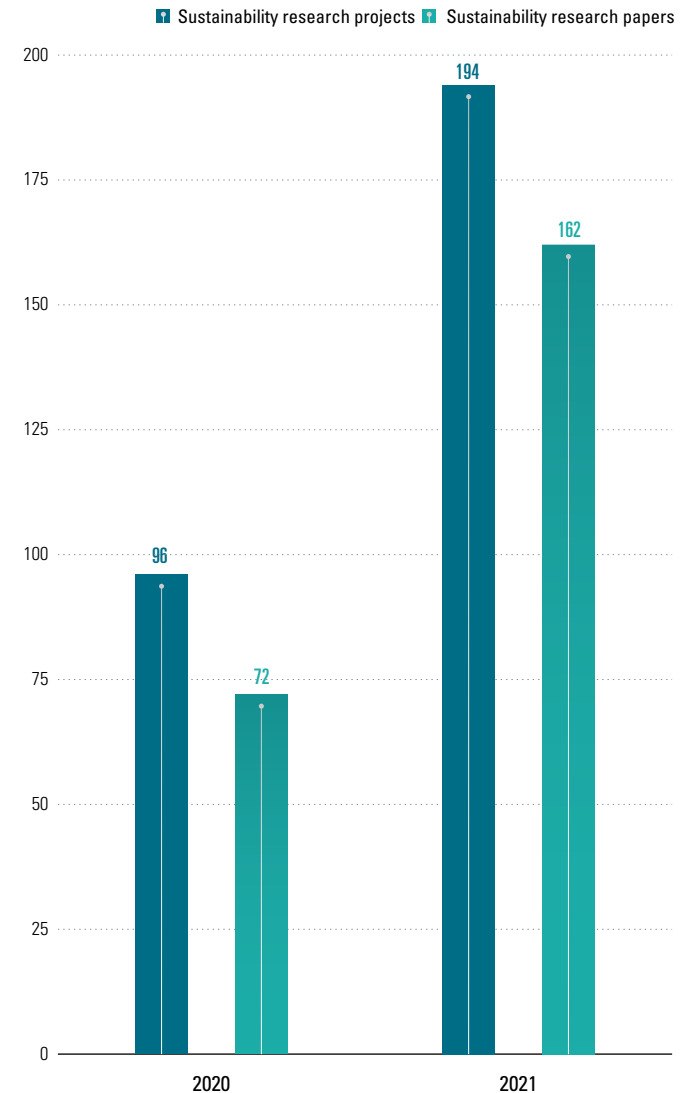
Statistics of sustainability research projects and research papers in 2021

College/Center	Total Number of Research Projects	Number of Sustainability Research Projects	Number of Research Papers	Number of Sustainability Research Papers
College of Engineering	98	64	287	51
College of Electrical Engineering and Computer Science	68	42	145	23
College of Maritime	18	15	32	9
College of Hydrosphere Science	25	23	201	45
Business Intelligence School	10	6	38	4
College of Management	36	23	88	22
College of Marine Commerce	9	8	27	4
College of Finance and Banking	0	0	-	-
College of Humanities and Social Sciences	5	3	1	0
College of Foreign Languages	9	6	3	0
College of General Education	3	2	17	1
Center for Innovation and Entrepreneurship Education	1	1	1	0
Office of Academic Affairs	1	1	3	3
Office of Physical Education	0	0	1	0
Total	283	194	844	162

25. The number of sustainability research projects and research papers was counted based on sustainability keywords defined by NKUST.

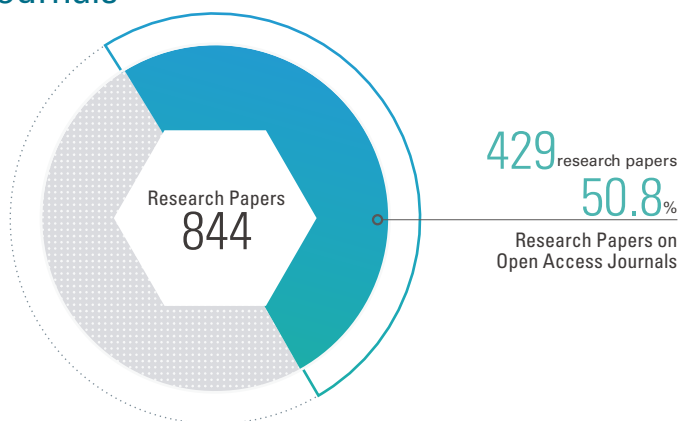
26. All 64 departments include independent graduate institutes, PhD programs, in-service programs and degree programs.

Number of sustainability research projects and research papers over the past 2 years



3.2 Research Papers on Open Access Journals

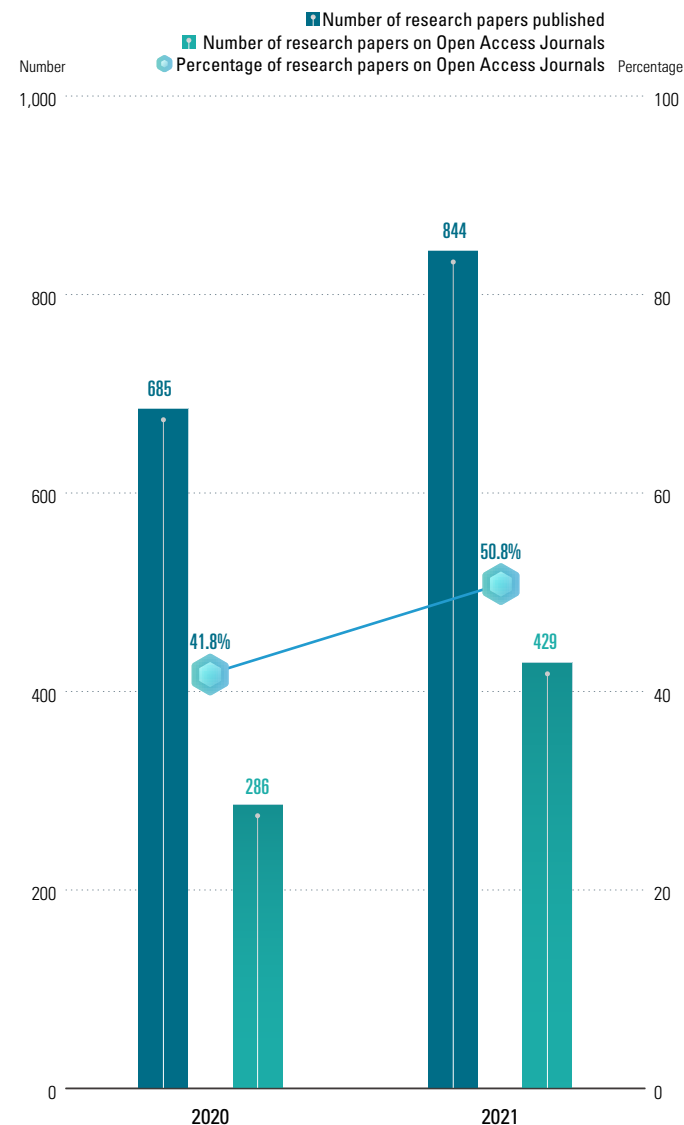
Open Access refers to research papers that are free and available to readers. The main purpose of Open Access is to make sure that everyone enjoys the right to free knowledge, realizing a free and fair environment for academic knowledge. NKUST published 844 research papers, and among which, 429 of them are on Open Access Journals²⁷, accounting for approximately 50.8%. Compared with 2020, the number increased by 9%, which shows NKUST's faculty and staff's efforts to promote the spread of academic knowledge.



Statistics of research papers on Open Access Journals in 2021

College/Center	Number of Research Papers	Number of Research Papers on Open Access Journals	Percentage of Research Papers on Open Access Journals
College of Engineering	287	143	49.8%
College of Electrical Engineering and Computer Science	145	81	55.9%
College of Maritime	32	22	68.8%
College of Hydrosphere Science	201	87	43.3%
Business Intelligence School	38	16	42.1%
College of Management	88	46	52.3%
College of Marine Commerce	27	16	59.3%
College of Finance and Banking	-	-	-
College of Humanities and Social Sciences	1	0	0%
College of Foreign Languages	3	0	0%
College of General Education	17	15	88.2%
Center for Innovation and Entrepreneurship Education	1	0	0%
Office of Academic Affairs	3	3	100.0%
Office of Physical Education	1	0	0%
Total	844	429	50.8%

Number of research papers on Open Access Journals over the past 2 years



27. The number of published research papers of NKUST in 2021 was downloaded from Web Of Science, and selected from the column of Open Access Designation. The data were obtained as of December 31, 2021.

3.3 University Social Responsibility (USR) Projects

University Social Responsibility (USR) Projects

In response to the policy of the Ministry of Education and effectively implement the business of university social responsibility, NKUST has set up the Office of Social Responsibility under the first level unit of the Office of Industry-Academia Collaboration and recruited a professional manager and several specialists to conduct comprehensive inventory and promote regional improvement strategies regarding development issues in Southern Taiwan. By integrating “strong connections with industries,” “innovation and entrepreneurship” and “ocean technology,” NKUST upholds the people-oriented core value and the operational mode of value co-creation to fulfill the mission of social responsibility. Additionally, the university has introduced the philosophy and structure of sustainable development goals (SDGs) of the United Nations to map out the sustainable placemaking blueprint, moving towards the national prospect of balancing urban and rural development.

Since the projects of university social responsibility (hereinafter referred to as the USR projects) were officially promoted in 2018, NKUST has executed 13 projects, receiving an accumulated subsidy of NT\$170 million. The number of approved cases and funding that NKUST received have been the top among national universities and colleges for five consecutive years. The following Table is the list of USR projects for the second phase (between 2020 and 2022) at NKUST.

USR HUB

In response to the USR project of the Ministry of Education, NKUST promotes USR HUB on campus with its micro social responsibility power, and guides teachers and students to be engaged in the task of social responsibility with substantial funding, administrative assistance, team demonstrations and other strategies.

For more detailed information about the USR projects, please refer to [NKUST's USR Annual Report](#).

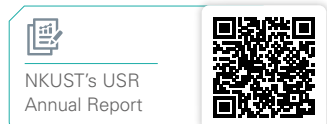


☑ List of USR projects for the second phase at NKUST

Project Name	Funding/Annual
Good Fish Next Door Project	NT\$11 million
Coastal Placemaking Diamond Fishing Village—Kaohsiung Yongan Fishing Village Project	NT\$8 million
Yanchao—Placemaking from New Agriculture	NT\$7.2 million
e-WATCHER	NT\$3.5 million
Living in Utopia: Harbor City Mountain Line Urban and Rural Resilient Construction Project	NT\$3.5 million

☑ List of NKUST USR HUB projects between 2020 and 2022

Project Name	Funding/Annual
The Youth who Harnessed the Wind Putting down Roots in Rural Chiayi Action Study Plan	NT\$500,000
Introduction of Smart Internet of Vehicles (IoV) to Lambai Island	NT\$500,000
For a Sustainable Kaohsiung: Fengshan District Revival	NT\$500,000
Promoting Agricultural Electronics and Information Education Combined with Food and Agriculture Education in Disadvantaged Elementary and Junior High Schools	NT\$500,000
Zuozhen District Local Creation and USR Project	NT\$500,000



University Social Responsibility and Industry-Academia Collaboration

◆ Introducing environmentally-friendly aquaculture techniques and concepts to help locals improve aquaculture

The “Good Fish Next Door Project” hosted by NKUST cooperated with fishermen in Linbian Township and Jiadong Township, Pingtung. It introduced the aquaculture technique of probiotics to improve water quality, increase the amount of local catch, and reduce the use of chemicals on fish to achieve the goal of saving water and electricity, gradually changing the operations and development of local fishery. The project team also conducted educational training and technical counseling seminars to assist local businesses to optimize their aquaculture techniques, which received the feedback of great satisfaction from 90% of local fish farmers in Pingtung. Additionally, the frequency of chemicals used for the Fourfinger Threadfin Fish in the breeding area was reduced by over 80%. The average daily water change in the model pool was reduced by more 5 centimeters (approximately 1,000 metric tons of water per hectare was reduced). The electricity consumption during the same period was also reduced by an average of 300kWh compared with last year (at least NT\$713 could be saved for each electricity bill).

◆ Combining the concept of circular economy and NKUST’s expertise to turn by-products of fish into new fish products

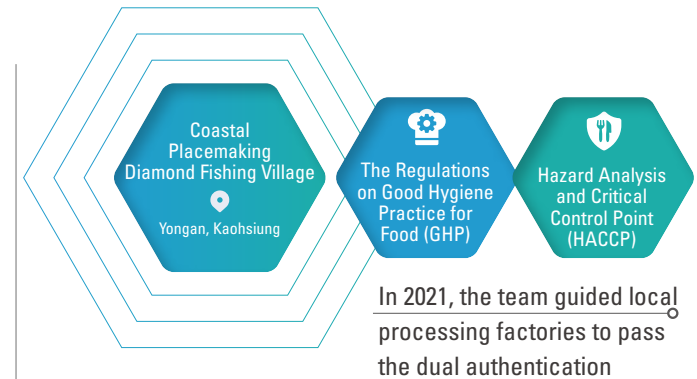
Aquatic product processing often produces a great amount of by-products such as fish skin, scales, and bones. Although these by-products can be made into feed and fertilizer, it is still important to think about how to produce more delicate and valuable products and make the most use of resources from bred fish. With the concept of circular economy, teachers of the Department of Seafood Science at NKUST instructed students to extract collagen from fish scales to produce scale collagen solution without the smell of raw fish, making it into an important raw material in processed food and widely being used in daily necessities. The “Good Fish Next Door Project” of NKUST also made the good use of fish waste and the by-products of fish, which not only increased the output value of local fishermen, but also incorporated the concept of circular economy to research, develop and process fish scales from fish farmers into marine collagen peptide masks, collagen extract drinks, beauty drinks and collagen ice cream. Meanwhile, NKUST cooperated with small fishermen to develop instant Fourfinger Threadfin Fish packs with diverse flavors by breeding the fish in an environmentally-friendly way.



Good Fish
Next Door Project

Linbian Township and
Jiadong Township,
Pingtung

The average daily water change in the model pool was reduced by more 5 centimeters (approximately **1,000** metric tons of water per hectare was reduced). The electricity consumption during the same period was also reduced by an average of **300** kWh compared with last year.



◆ Guiding local processing factories to pass dual authentication for food safety and implement self-management mechanism for hygiene and safety

The team of the “Coastal Placemaking Diamond Fishing Village—Kaohsiung Yongan Fishing Village Project” of NKUST cooperated with Yongan Fishing Village in Kaohsiung with the goal of “coastal placemaking” in the hope of bringing benefits to the region together. In 2021, the team guided local processing factories to pass the dual authentication of “The Regulations on Good Hygiene Practice for Food (GHP)” and “Hazard Analysis and Critical Control Point (HACCP)” to achieve the goal of food safety. This not only increased job opportunities, but also brought more revenues to fishermen. Additionally, young people were more willing to return to their hometown, and local power was coagulated to create local placemaking. After assisting local processing factories to obtain certification, NKUST still continued to help these factories implement the food safety control system. In addition to providing educational training, NKUST conducted online educational training for the safety management of food warehouses, built the authentication and training mode for processing factories, and introduced professionals to help industries implement the self-management mechanism for hygiene and safety. NKUST successfully guided 74 students to obtain the certification of “HAPPC 60A” and 59 students to obtain the certification of “HAPPC 60B” in addition to enhancing the goal and efficiency of the policy the government had promoted.



NKUST is the only one school in Taiwan that has received over **NT\$30 million** of subsidies for its USR projects.

◆ **Expanding the business model with the industrial alliance and elaborating research power to develop new opportunities for agricultural issues**

It is also an important industrial-academia link to apply academic research to industrial development, pioneering a business model. The team of “the Coastal Placemaking Diamond Fishing Village—Kaohsiung Yongan Fishing Village Project” of NKUST helped with educational training for relevant personnel, and implemented the food hygiene and safety mechanism. Additionally, the team paid attention to the sustainable development of the venue, and planned on cooperating with Yongan Fishermen’s Association and Fu Che Frozen Food Co., Ltd. to elaborate the capacity of industry-academia collaboration, as well as trying to expand its business model. In 2020, the team promoted the giant grouper porridge with Fu Che Frozen Food Co., Ltd., and the product was officially sold in an American mall in July next year. Starting 2021, the team purchased approximately 4 tons of giant grouper with the local fishermen’s association, and made over 150,000 bowls of giant grouper porridge, creating NT\$15,000,000 of the annual production value on a conservative estimate. In the same year, in order to solve the problems of excess agricultural products, the imbalance of production and sales, the collapse of prices and so on, the project R&D team adopted diverse processing techniques, and integrated local ingredients to foster the agriculture and fishery cooperation to make the instant soup of “perch soup with pickled pineapple,” and to co-organize “Major Processed Agricultural Product Launch” with the industrial alliance, creating new opportunities for industries. The project team has been dedicated to the R&D of products over the past few years. Its products are sold on the market. Additionally, it promoted the “Soup Gifts for the Lunar New Year” at the end of 2021 to show its capacity of researching and developing products, which has indirectly promoted local industries, and fostered the transformation and upgrade of aquatic products.

◆ **Establishing a desire influence investment platform to integrate resources and promote sustainable development**

In addition to the improvement of techniques, and the R&D of products, an investment platform that integrates resources is an important medium that promotes the result of industry-academia collaboration as well as the creation of sustainable value. NKUST’s team of the “Yanchao Placemaking with New Agriculture Project” cooperated with farmers in Yanchao District, Kaohsiung to promote the rebirth of agriculture from the five major aspects of “friendly farming environment, the improvement of agricultural labor shortage, the introduction of smart production, marketing value-added agriculture, and the ecological circulation of agriculture.” In 2021, the project team coupled with National Sun Yat-sen University to guide startup companies, and establish the “Desire Influence Investment Platform” to provide services of matching up partners and integrating resources. The platform has so far

successfully helped establish 7 local startup companies. Among which, Yun Cui Shi Li Art and Culture Co., Ltd. discovered a business opportunity from the pineapple export obstruction incident in 2021, so by making the good use of guidance resources for social enterprises provided by the Social Enterprise Development and Research Center of National Sun Yat-sen University, it created the brand of “Da Chu” to promote the fruit tea gifts of “Pineapple Jin Xuan Tea” and “White Peach Oolong Tea” to effectively solve the risk caused by Taiwan’s fresh fruit export and the social problem triggered by the excess production of fresh fruit, bringing positive influence on society. The “Desire Influence Investment Platform” still continues to operate today, fulfill its social responsibility and create sustainable value.



3.4 Sustainable Industry-Academia Collaboration Projects

NKUST pays attention to smart manufacturing, smart commerce, ocean technology, sustainable technologies and cultural creation, and cross-disciplinary industry-academia collaboration. NKUST takes advantage of industry service experience inherited from the Center for Regional Industry-Academia Collaboration, Ministry of Education, strong R&D service capacity, and results from close cooperation with the local government to develop sustainable industry-academia collaboration projects. In 2021, there were 230 non-governmental industry-academia collaboration projects relevant to sustainability, with a total of NT\$199,789,172. NKUST conducted numerous projects with other enterprises in the aspect of sustainable green energy, including the marine ecology survey project, the control standards, analysis and research of harmonic waves in the power grid tie. In the aspect of environmental protection and safety, NKUST carried out the environmental monitoring project for the water purification plant at Cheng Ching Lake, the environmental impact assessment (EIA) of offshore wind farms, and many other projects. With respect to the issue of pollution, NKUST helped carry out the impact monitoring and assessment project for the dump of dredged mud from ports into the ocean, and the newly-planned project for monitoring the dump of dredged mud and sand into the ocean. In the aspect of sustainable development and education, NKUST took charge of the sustainability and community environmental education project, the implementation project of corporate governance and corporate social responsibility, the promotion project for the application and development of smart electronics talents, and the project of assisting companies and groups to participate in the promotion of environmental education. Additionally, NKUST conducted the fishery guidance project for Mailiao Township and four other townships, and numerous sustainability projects relevant to the R&D of ocean technology in the aspect of aquaculture and guidance. Moreover, NKUST continues to develop the authorized guidance and technical service project for the improvement of safety and management of manufacturing processes, the R&D of sustainable materials, the development of environmental perception technologies, smart manufacturing and AI sustainability, and other sustainability projects in the aspect of sustainable industry-academic collaboration and the R&D of smart technologies.

Additionally, the Department of Aquaculture of NKUST cooperated with Formosa Plastics Group to help fish farmers in Mailiao Township,



In 2021, NKUST conducted **230** non-governmental industry-academic collaboration projects relevant to sustainability, with a total of **NT\$199,789,172**.

Yunlin County solve problems. In 2013, both parties started promoting the "Research Project for Improving Aquaculture Fishery Techniques in Mailiao Township and for Enhancing Added Value of Aquatic Products." To solve problems that fishermen had encountered when breeding fish, the guidance team developed the rapid test kit for water quality and pathogenic bacteria, and promoted risk management for fish breeding pools to lower risks during the breeding season. The team set up 2 probiotics factories in Mailiao Township and 4 other townships. The factories taught fishermen to breed fish by following the seasons, and changing the aquaculture environment. Additionally, the fishermen were taught to use probiotics correctly to help bred creatures grow fast with sweet meat. Moreover, a technology exchange center was set up to help forge the friendship between the team and fishermen. Personnel were designated to patrol fish farms, and instruct fishermen to use scientific testing tools to command water quality anytime. The project effectively improved the local aquaculture environment, and shortened processing time, which further elevated fishermen's revenues.

Meanwhile, NKUST has formed long-term partnership with Industrial Technology Research Institute, Institute for Information Industry, Metal Industries Research and Development Center, and other private sectors. NKUST actively cooperates with government agencies and corporations to execute projects subsidized by the government. Additionally, NKUST has coupled with them to discover the needs of local companies, and solve local issues to create local value, realizing the objective of the Greater South Technology City. Every year, NKUST works with Metal Industries Research and Development Center to implement the "Industrial Guidance and Innovation Project for Industrial Parks." By visiting companies in the industrial park in person, NKUST obtains the



▲ The matching platform for industry-academia collaboration

instant feedback and the needs of industry-academia collaboration. Moreover, NKUST is dedicated to cultivating cross-disciplinary intellectuals with companies, promoting the task of talent and technique sustainability (such as carbon credit and environmental authentication) in the hope of minimizing the gap between students' knowledge and skills. NKUST hopes to cultivate cross-disciplinary employees who can apply what they have acquired at school to their jobs with companies.

Last but not the least, to enhance the industry-academia collaboration opportunities of NKUST's teachers and industries, and the matching efficiency for them, the Office of Industry-Academia Cooperation of NKUST has set up a matching platform for industry-academia collaboration. The platform presents the R&D results of teachers, the analysis of industrial trends, the introduction of the University-level Research Center, latest events, and the introduction of new industry-academia collaboration teachers. Meanwhile, the platform is for members only. Therefore, if companies would like to learn more about teachers, technologies, and industry-academia collaboration, the platform would match them up with teachers who would introduce professional techniques once companies sign up as a member. In addition to providing information about the capacity of NKUST and the research fields of teachers for enterprises to know rapidly about, the platform helps companies upgrade and develop their products and techniques to enhance the industry-academia research projects and the technology transfer of patents of the university. Moreover, it matches teachers' results in the R&D of technologies with industries to commercialize their products, guide startup enterprises, and build a sustainable strategy alliance to provide the one-stop industry-academia service.

3.5 Sustainability Projects with Government Agencies

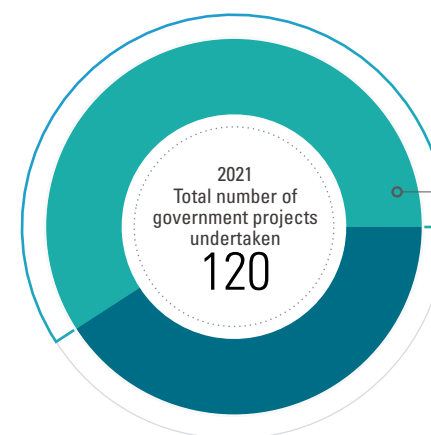
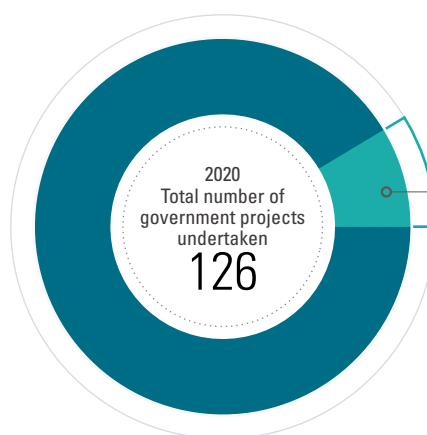
In 2021, NKUST undertook a total of 120 governmental industry-academia collaboration projects, and 71 of them were sustainability projects, with a total of NT\$774,659,677. These projects mainly responded to the issues of pollution, infrastructure, and environmental conservation monitoring. In the issue of pollution, NKUST carried out the 2021 check and management project for the origin of toxic and concerned chemical substances, the study on the energy use of vessels at harbors, and the assessment of air pollutant emission detection technologies and numerous other projects. With respect to industrialization, innovation and infrastructure, NKUST conducted the authorized professional services for the promotion of development of public transportation in Kaohsiung City. Moreover, NKUST took charge of the 2021 Kaohsiung City ocean environmental monitoring project, the 2021 Penghu County campaign and training project for the removal of nets at the seabed, and the 2021 development project for tide prediction and weather forecast data.

2021 Check and Management Project for Origin of Toxic and Concerned Chemical Substances

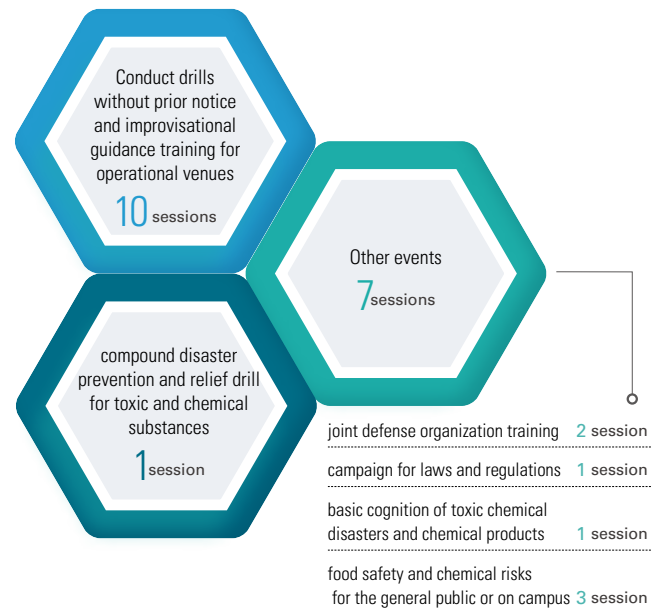
With the increase of demand for daily chemical products, the manufacturing industry uses a wide variety of chemicals frequently, relatively elevating risks. Therefore, if effective management for the origin of toxic and concerned chemical substances and food safety can be carried out, the probability of occurrence of disasters caused by toxic and concerned chemical substances will be significantly reduced, cutting down hazards to the environment and human body.

To improve the problem of environmental pollution, NKUST's Southern Center for Emergency Response of Toxic Substance worked with Environmental Protection Bureau, Pingtung County Government to promote the operation and management of toxic substances, and the rescue relief and prevention of disasters to enhance the intensity of management for toxic substances, achieving the goals of "origin control," "examination and management," "audit, guidance and control" and "increasing suppliers' responsibility."

✓ Number of government projects undertaken by teachers over the past 2 years



NKUST carried out regular checks, full-scope audit, and the real-time tracking system (global positioning system, GPS) and abnormality checks for the transport vehicles of toxic chemical substances. Additionally, experts and commissioners were appointed to conduct drills without prior notice and improvisational guidance training for operational venues. A total of 10 sessions of drills and training were completed. The audit and participation of commissioners helped improve the management mechanism of suppliers, perfecting their internal operation and management procedures. Moreover, 7 other events were held, including 2 sessions of joint defense organization training, 1 session of campaign for laws and regulations, 1 session of basic cognition of toxic chemical disasters and chemical products, and 3 sessions of food safety and chemical risks for the general public or on campus. Through interactive games, the event attracted people's participation, promoting the Five-point Food Safety policy. Furthermore, 1 session of compound disaster prevention and relief drill for toxic and chemical substances was held. The scenario of the drill integrated with the disaster prevention and relief project in Pingtung County. The drill enabled participating units to be familiar with their report mechanism, personal protective clothing, and tools to achieve the goals of having regional disaster prevention and relief abilities, and campaigning disaster prevention.

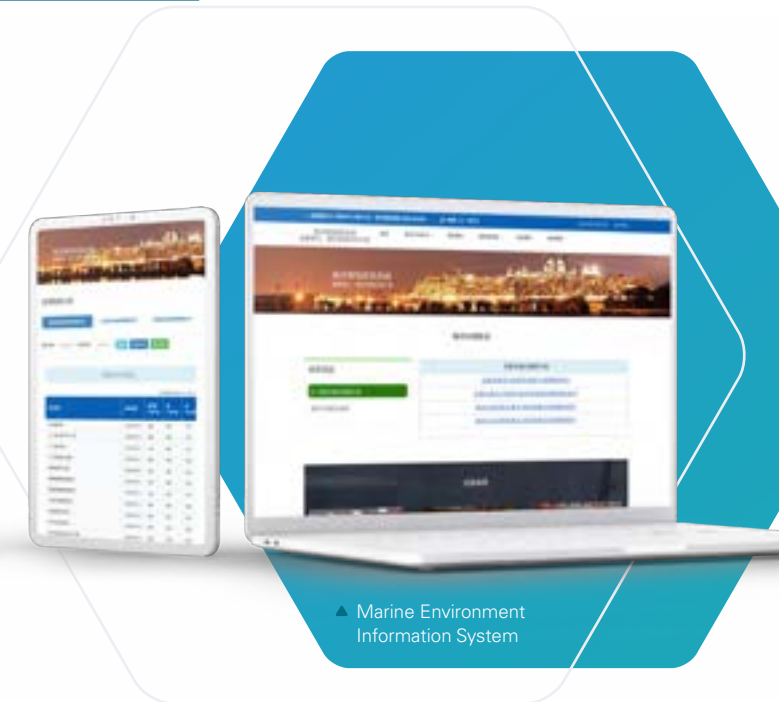


2021 Kaohsiung City Marine Environmental Monitoring Project

The total length of Kaohsiung City's coastline is 83.6 kilometers (with 65 kilometers of direct distance), from the estuary of Erren River in the north to the estuary of Kaoping River in the south. River estuaries, a military port, commercial port, fishing port, coastal parks, and other coastal areas are under the jurisdiction of Kaohsiung City. Water quality in the ocean often drastically changes in a split second due to the change of the natural environment and artificial factors. The sea area that is impacted by pollution sometimes improves within several days, but sometimes lasts for a long period of time.

Since 2016, the Department of Marine Environmental Engineering of NKUST has started to execute the marine environmental monitoring project for Kaohsiung City. The project analyzes test results based on data, builds the background information of the sea area, and compares the change of water quality data in the marine environment over the past few years to effectively command water quality in each sea area in Kaohsiung City. The project has not only improved the control of pollution sources, but also timely responded to marine disasters and follow-up restoration tasks to prevent marine pollution, achieving the results of marine environmental protection and sustainable resources.

The water quality, hydrology, bottom materials, and ecological resources in the sea area were investigated, and the project continued to compile environmental monitoring data in the sea area of Kaohsiung. The information served as references for marine environmental protection, marine ecological protection and restoration in the future. Additionally, NKUST conducted the task of water quality sampling, provided educational training for environmental testing and sampling, and co-organized the testing and analysis of marine pollution incidents. NKUST not only cared about the water quality monitoring items for the sea area, and the prevalence of water quality monitoring stations, but also publicized relevant information on the university's website, enabling the industry-government-academy circles, and the general public to have a better understanding of the marine environment under the jurisdiction of Kaohsiung City. In 2019, the website of the "Marine Environment Information System" managed by NKUST's execution team was the realization of the ideal. The website showed the response projects for marine pollution in Kaohsiung City, laws and regulations on marine pollution control, the photos of events organized or co-organized by Marine Bureau, Kaohsiung City Government, and magazines and e-books published by Marine Bureau, Kaohsiung City Government for people to read online.



Monitoring results for hydrology, water quality, bottom materials, and ecology have been compiled and organized in the "monitoring database," and they are available to the industry-government-academy circles and the general public for free.

According to the 2021 project for water quality monitoring results, each water quality station from the first quarter to the fourth quarter conformed to the water quality standards of the sea area where it was located. The bottom material monitoring results were similar to those in the past few years. The sea area by Kaohsiung Harbor showed heavy metal enrichment, and there was no significant difference in the species composition of plankton and benthic creatures, which were all commonly-seen species over the years. However, the intensity and distribution of these creatures changed with seasons due to the conditions of the natural environment and the natural life cycle of the ecosystem.

Study on Energy Use of Vessels at Harbors and Assessment of Air Pollutant Emission Detection Technologies

Since the United Nations Framework Convention on Climate Change took effect, the marine shipping and transportation industry has always not been included in the Greenhouse Gas Emission Reduction Agreement. Vessels constantly emit air pollutants from burning a great amount of fuel oil in the shipping process, especially when they sail by the coast or moor at the harbor. Pollutants emitted from vessels cause a great impact on people's health and the ecological environment. To effectively reduce the emission of air pollutants from vessels of the marine shipping and transportation industry, Maritime Port Bureau, Ministry of Transportation and Communications in Taiwan also responds to an international covenant formulated by Marine Environment Protection Committee under International Maritime Organization (MEPC of IMO) to prevent pollution caused by vessels by controlling foreign vessels and domestic vessels entering the area of Taiwan's southern harbors to use low sulphur fuel oil (LSFO) with a sulphur content not exceeding 0.5%, or devices or alternative fuels with the equivalent emission reduction effect.

The study emphasized on probing into the analysis and assessment of detection technologies for the emission of air pollutants from vessels at Taiwan's ports. Additionally, the study planned the feasible detection technologies for air pollutant emissions from vessels based on the environmental features and conditions at Taiwan's ports to effectively investigate the switch of fuel oil when vessels navigate in the future.

The results of the study showed that in response to the promotion and implementation of the IMO 2020 policy, shipping companies around the world used low sulphur fuel oil (LSFO) with a sulphur content not exceeding 0.5% or installed devices with the equivalent emission reduction effect. Both shipping companies home and abroad reduced the use of heavy fuel by between 4% and 22%. In 2021, the study held two expert and scholar seminars to discuss the analytical results of detection technologies for air

pollutant emissions at ports home and abroad, the analysis of advantages and disadvantages of existing air pollution control strategies for vessels, the feasibility of planned detection technologies for air pollutant emissions from vessels, and other issues. Additionally, experts and scholars had interviews with application units chiefly regarding the vessel auditing PSCO (port state control official), the use of low sulphur fuel oil (LSFO), and the application units' opinions about the feasibility of adopting detection technologies.

The planning of the techniques, and the analytical results of the information helped Taiwan's Institute of Transportation, and Maritime Port Bureau of the Ministry of Transportation and Communications, and Taiwan International Ports Corporation Ltd. to plan Taiwan's marine affairs and pollution prevention and audit the control of low sulphur fuel oil (LSFO) used by vessels to provide the developmental direction of technologies and serve as assistance in the formulation of strategies.

Citizens' World Cafe Talks about 100-year History of Qieding District

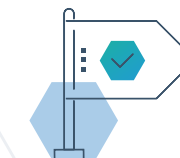
The project was a civic engagement project of Kaohsiung City Government in 2021, and it aimed to solve the problems of population exodus and economic recession due to the change

of industrial environment in Qilou, Qieding District. The project, featuring the issue of "Slow Travel," was the extension of the civic participation project in Qieding District in 2020. It gathered local residents, and academic and research experts to discover and organize the slow travel DNA of Qieding District, as well as connecting tourist attractions. By coloring and activating old streets, tourists from other places are attracted to admire the art, further promoting consumption, elevating the revenues of local stores, and activating economy and tourism. Moreover, in the one-day trip of visiting the colorful old street, tourists can have a guided tour in the wetlands, enjoy sunset by the coast and buy aquatic products at the fishermen's market. It is an interesting trip with local features.

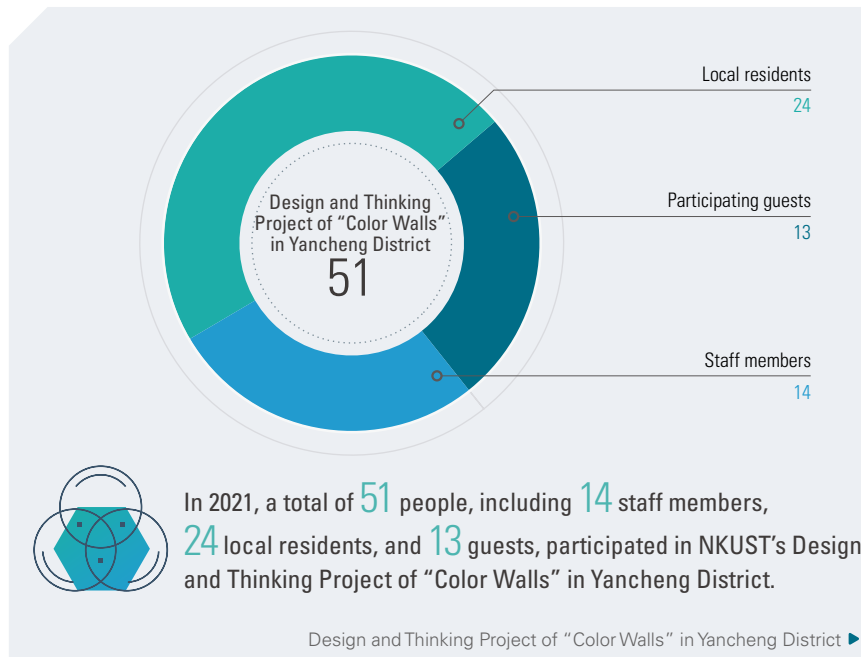
80 people, including lecturers, distinguished guests, participants and staff members participated in the project. It was a cross-disciplinary expert team composed of NKUST's teachers, travel agencies, and the city tour guides of Kaohsiung City. The team led the residents of Qieding District to discuss the issues of slow travel, color painting works and marketing travel light from the perspectives of local features. The event broke the mode of top-down decision-making, and adopted open discussions to enable the public to express their expectations of their hometown. Experts and distinguished guests at the event also gave them positive feedback.



The event of
"Citizens' World
Cafe Talks about 100-
year History of
Qieding District"



80 people, including lecturers, distinguished guests, participants and staff members participated in the project.



Design and Thinking Project of "Color Walls" in Yancheng District

The project which was a civic participation project of Kaohsiung City Government in 2021 featured the topics of "Culture, Light Rail and Food" in Yancheng District to guide the public to explore the district. The project hoped to integrate the city views of the Kaohsiung Light Rail with community art to enrich the artistic atmosphere of Yancheng District and to turn it into an example of tourism and residences. The project aimed to start from the history, culture and food of Yancheng District. Centering on the light rail station in the district, the project team drew mural paintings on the external walls of old buildings in the local communities to reverse their old images, and activate the entire space to make public art become a part of residents' daily life, creating an excellent living quality for them.

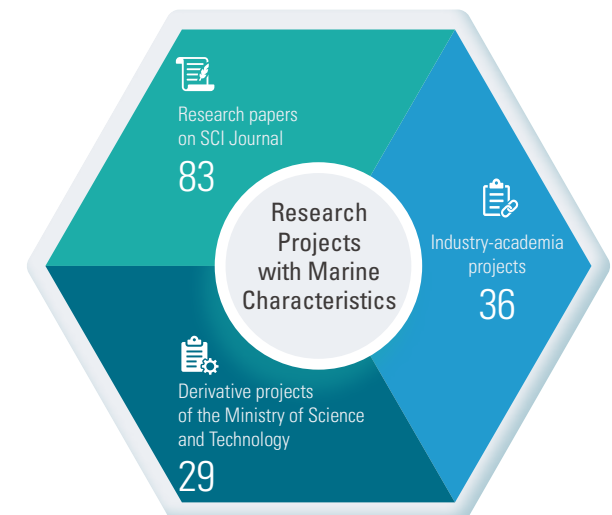
The workshop organized by the project invited the future color wall company to explain their construction method and design philosophy to local residents, and the professors of the Department of Industrial

Design analyzed community painting art cases home and abroad to guide participants to do divergent thinking with 100 special themes related to Yancheng District. Participants made the theme of the color walls based on the scenario of a story, producing the prototype of the color walls in the end. The 51 participants of the workshop included 14 staff members, 24 local residents, and 13 participating guests. A cross-disciplinary teacher-student team was formed by the Development Center of Marine Leisure and Sports Industry, the Department of Industrial Design, the Department of Marketing and Distribution Management, and the city tour guides of Kaohsiung City, and it gathered the opinions of residents of Yancheng District about local features, integrating the issues of local history, culture and painting art. In the end, participants came up with 5 cases inspired by the theme of the color walls, and 3 installation art models to serve as references for community reforms in the future.

3.6 Other Research and Cooperation Projects

Research Projects with Marine Characteristics

NKUST develops key research fields with marine characteristics, and by offering subsidies for research projects with marine characteristics, NKUST encourages teachers to form cross-disciplinary cooperation research teams to coagulate research capacity. Additionally, through research results, NKUST observes the developmental needs of industries, combining techniques with the application trend. The research projects with marine characteristics are carried out with the New Enlistment Program and Excellent Highlights Program in the hope of achieving the spirit and goal of inheritance with the leadership of teachers with excellent research performance, and enhancing the entire research standards of NKUST. Moreover, the performance indicators of the projects combine with the benefits of critical cores in the aspect of research and industry. In 2021, NKUST published 83 research papers on SCI Journal, 29 derivative projects of the Ministry of Science and Technology, and 36 industry-academia projects.



With respect to the research results of students, NKUST approved and subsidized 12 research projects of students with marine characteristics to encourage students to fortify the depth and width of their research into marine issues when they were in the process of meditating on their cross-campus, cross-department or cross-institute research projects featuring marine fields. To solve the energy problems that Taiwan was facing, student teams were dedicated to researching into marine power generation technologies, and proposed the project of “Screw Type Point Absorptive Wave Energy Buoy” to research and develop a wave generator. The team adopted the screw type point absorptive method to increase the efficiency of power generation, and create a sustainable environment with clean energy. Furthermore, economic development inevitably causes the pollution of the ecological environment. A great amount of plastic products and waste flow and drift to the depth of the ocean, leading to the serious destruction of the marine ecological chain. To improve the pollution problem, a student team proposed the research project of “constructing the environmental map and monitoring ocean drift litter with aerial images along with deep learning and the reconstruction of 3D models.” The team adopted the principle of sensors to receive electromagnetic waves emitting from the target on the surface of the Earth. After the data were processed and checked, the team developed a monitoring system for ocean drift litter with the technology of image recognition. Automatic litter collecting robots then cleaned up ocean drift litter with the assistance of the image positioning and navigation system for ocean drift waste to build a clean marine environment, restoring ecological conservation.

Moreover, NKUST encourages teachers to guide students to strive for college student research projects subsidized by Ocean Affairs Council. In 2021, 3 projects were subsidized. Among which, the project of “Two-way Blade Wave Energy System of Floating Horizontal Axes” was proposed by Yue-Hao Zhang, student of the Department of Naval Architecture and Ocean Engineering (Professor Min-Hsiung Yang was his advisor.), and it won the 2021 Excellent Project Award from Ocean Affairs Council. To foster the sustainable development of the marine industry, environment, technologies and human resources, NKUST continues to implement the innovation of cross-disciplinary researches, cultivating excellent talents.



Good Fish
Next Door Project

Linbian Township
and Jiadong Township

The strategy of
“friendly aquaculture technologies”

The project held about **200** sessions of caring
activities, serving approximately **4,200** people.

University Social Responsibility Project—Good Fish Next Door Project

To comply with the marine features and research projects of the university, NKUST served Linbian Township and Jiadong Township when implementing the Good Fish Next Door Project, a university social responsibility implementation project. Focusing on the aquaculture, the project pointed out the dilemmas fishing villages were facing, and their local DNA. With the capacity of NKUST’s faculty, student teams were led to adopt comprehensive strategies to try to solve the problems of unhealthy industrial structures, imbalanced production and sales, inappropriate use of environmental resources, and the exodus of young population in the two regions.

In a great structure, NKUST’s faculty conducted comprehensive planning and internationalized service. The strategy of “friendly aquaculture technologies” introduced the concept of friendly aquaculture to local fishermen to elevate the outcome of production and management. The project held about 200 sessions of caring activities, serving approximately 4,200 people. The program of the “R&D of aquatic products” extended the use of agricultural and fisheries products or their by-products, and conducted innovation, application and R&D on these products to create new values to the products, further commercializing them. Additionally, the program confirmed the operational feasibility of these products, successfully developing the collagen beauty drink, collagen ice cream, and instant packs with various flavors. Furthermore, in addition to setting up the “Good Fish Next Door

production and marketing platform,” and “promoting food and fisheries education and experience tourism,” NKUST has signed a contract with i3Fresh, an e-commerce platform for agricultural and fisheries products, to help numerous small aquatic product suppliers to sell their aquatic products. The brick and mortar store of i3Fresh has officially started operating. With respect to international affairs, the project team continued to co-host the product R&D workshop with Kagoshima University in Japan, and held expert seminars to enable local fishermen or young fish farmers to exchange with aquatic product trading companies in Taiwan and Japan. The cooperation has not only increased both parties’ understanding of the current development of the industry, and the international trend of aquaculture, but also opened up a channel to the export market, elevated the international competitiveness of the traditional industry, and achieved 5 qualitative influence aspects in the international connections. Moreover, the project promoted the international vision of talents, the cultivation of placemaking abilities, and the connections of agricultural and fisheries communities in Taiwan and Japan. The project not only helped students care for disadvantaged groups in remote towns, which were affected by the COVID-19 pandemic, but also created international exchange opportunities for local fishermen and aquatic product suppliers.

4

CHAPTER

Talent Cultivation

4.2

Digital and Open Courses

4.3

Affiliated Institute of
Continuing Education

4.4

Quality Education with
Marine Characteristics

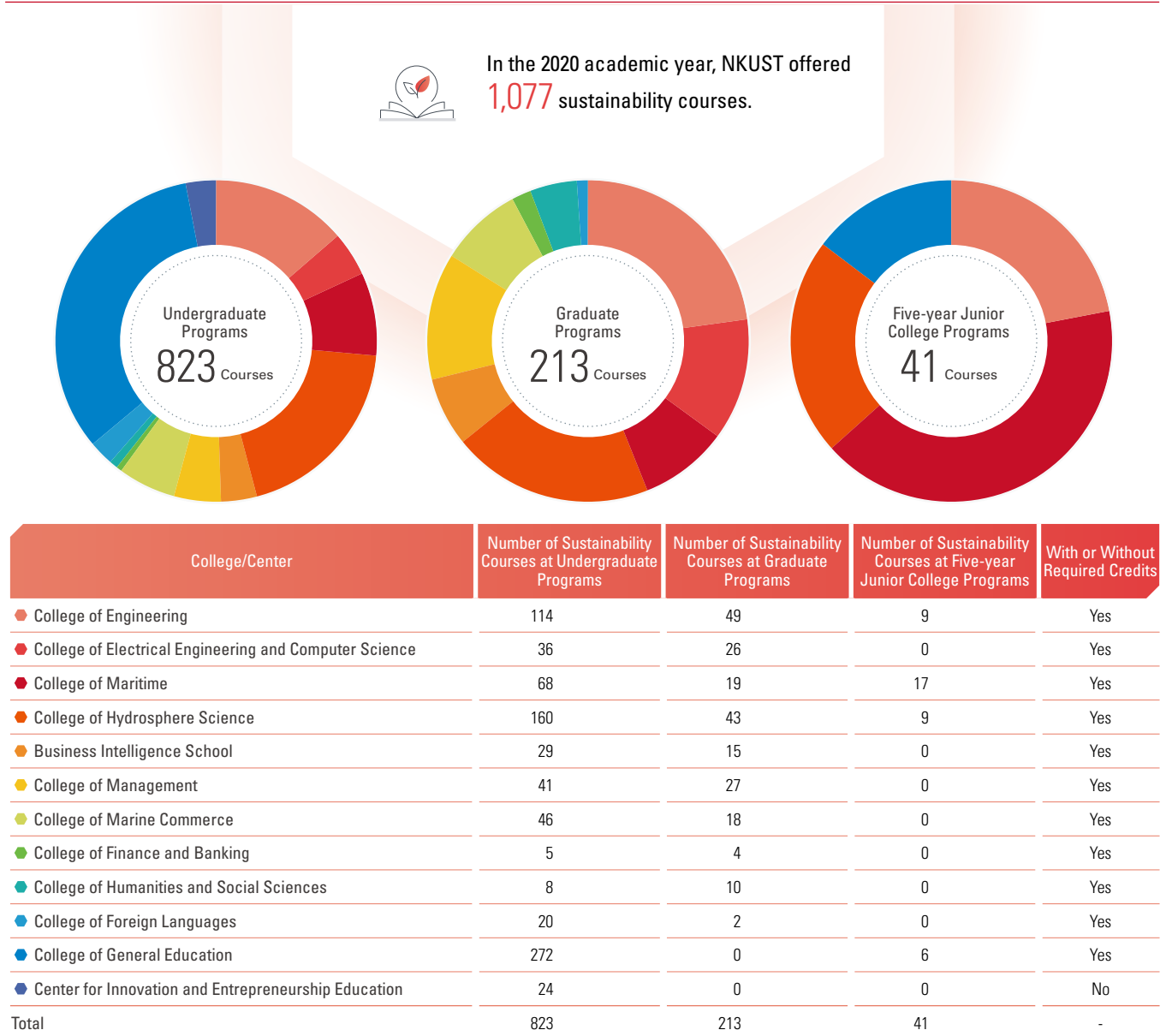
4.1

Sustainability
Courses

4.1 Sustainability Courses

Educating students is one of the main missions of the university. Based on its unique advantages and characteristics, the university helps students understand and respond to the sustainable challenges of the future, as well as providing courses covering sustainability issues to help them acquire the knowledge and skills. By cultivating future leaders, scholars, workers, professionals and so on, society can move towards a sustainable future. The courses of NKUST integrate the three major advantages and characteristics of “strong connections with industries,” “innovation and entrepreneurship,” and “marine technology.” In the 2020 academic year, NKUST offered a total of 1,077 courses covering sustainability issues (823 courses in the undergraduate programs, 213 courses in the graduate programs, and 41 courses in the five-year junior college programs). There were 58 departments and institutes offering at least one sustainability course. Additionally, 34 departments and institutes made sustainability courses mandatory. In the 2020 academic year, NKUST’s sustainability courses chiefly focused on the three core sustainability goals of “the conservation of marine and terrestrial ecology,” “industrialization, innovation and infrastructure,” and “quality education,” being complemented with the four core sustainability goals of “urban and rural sustainability,” “health and well-being,” “appropriate jobs and economic growth,” and “affordable clean energy” to help students understand and respond to the sustainable challenges of the future.

☑ Number of sustainability courses²⁸ and required courses at departments and graduate institutes in 2021



28. The number of sustainability courses in the 2020 academic year was counted based on sustainability keywords defined by NKUST.

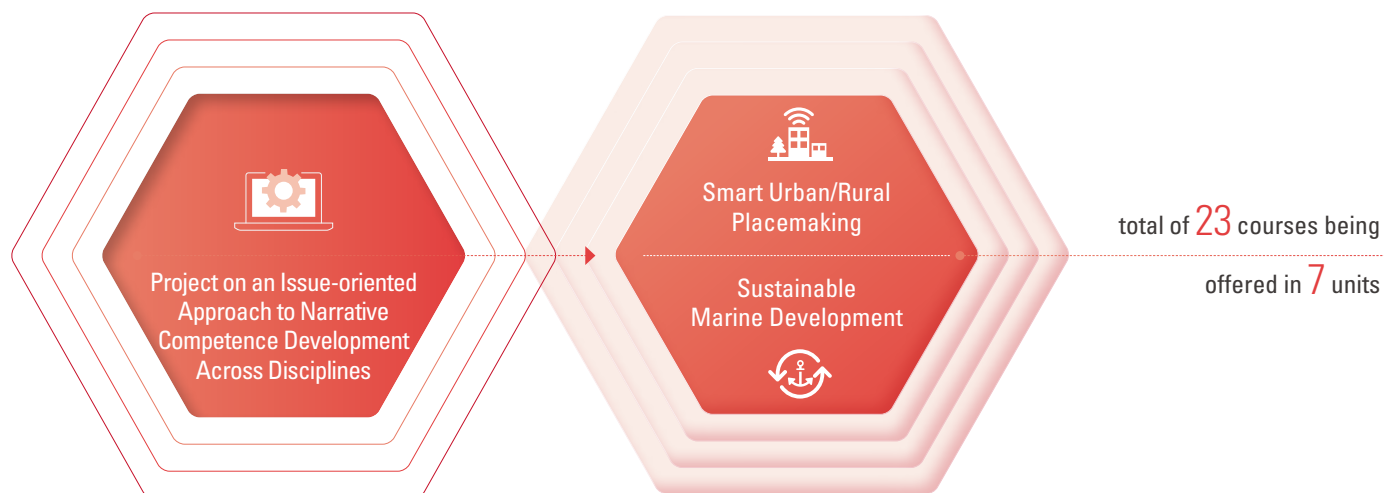
To encourage colleges, departments and institutes to offer sustainability courses, NKUST gradually provides incentives to faculty who offer sustainability courses. In the 2020 academic year, in line with the implementation of the “Project on an Issue-oriented Approach to Narrative Competence Development Across Disciplines” organized by the Ministry of Education, NKUST developed the course module covering the issue of sustainability by offering the two course groups of “Smart Urban/Rural Placemaking” and “Sustainable Marine Development,” with a total of 23 courses being offered in 7 units (General Study Center, Center for the Liberal Arts, the Department of Information Management, the Department of International Business, the Department of Seafood Science, the Department of Marine Leisure Management, and the Department of Fisheries Production and Management). These courses included field trips for students to understand issues in the real world as follows:

◆ **Smart Urban/Rural Placemaking Course Group**

Urban and rural sustainability is an issue of living places that people are facing nowadays, and it includes the loss of culture, the disappearance of historic sites, the destruction of the

natural environment, and the decline of industries caused by population exodus and aging. NKUST hopes to encourage students to care about people, matters and objects around them to build their cultural and caring spirit through the course group. After teachers introduced the course group in class, students had a primary understanding of the issue of urban and rural sustainability. Next, teachers led students to real venues, enabling them to realize the fermentation of the issue in reality in person. Meanwhile, professional local tour guides were invited to visit these sites with students, illustrating local historical knowledge and cultural context to help students possess a more complete cognitive structure. Tour guides could provide the best assistance especially when students had any questions or the need to interview locals during a field trip. Thanks to the help of local tour guides, students could have a deeper understanding of potential capacity and secret concerns from phenomena they had observed during the visit and viewpoints that were worth reflecting upon. Moreover, the tour guides guided students to probe into the core issue of urban and rural sustainability from a different standpoint, further coming up with solutions to the issue.

Fengshan District, Kaohsiung was the chief area to visit for the urban and rural placemaking course group. The course group first thoroughly built students’ cognition of Fengshan District, an ancient city, and attempted to extend their impression on the region and the fermentation of the issue to let them search for and organize local historical data and documents to connect new knowledge that they acquired during the field trip, urging them to think about the feasible plans for the sustainable development of the ancient city and old township. Moreover, teachers designed missions based on their teaching objectives by asking students to make copy, proposals, models, board games, and the Apps of games as narrative carriers to inspire students’ creativity, integrating knowledge and theory with core issues. Students were guided to share their solutions to these issues, and to implement them in the aspects of regional development and community building. The issue-oriented teaching method not only helped students become aware of the problems a region was facing, but also urged students to actively comprehend local information, and to think about narrative methods to solve issues to cultivate students with diversified narrative competencies.



Smart Urban/Rural Placemaking Course Group—Course and field trip of local culture exploration

◆ Sustainable Marine Resources Course Group

NKUST attempted to integrate the concept of sustainable marine resources with various courses. For example, the stereotype for the subject of Chinese language and literature might include basic and predictable content and instructional methods. However, the course of Chinese language and literature at NKUST gives students widely different learning experience as it combines with the marine characteristics of the university. Yongan District, Kaohsiung City was the destination of a field trip for NKUST's course of Chinese language and literature. Yongan District is a coastal administrative district of Kaohsiung City with the lowest population. In the early days, the salt industry was its main production type. NKUST guided students to visit Yongan Fishing Village in the courses of general Chinese language and literature and practical writing to enable students to understand how to make the culture of the fishing village sustainable through literary creation. Students painted salt manufacturing procedures and techniques with murals by visiting the community of salt



Practical writing
course—Field trip
to Wushulin Salt
Company

fields. Tools and utensils for manufacturing and drying salt are still preserved in the Office of Salt Affairs with the Baroque style. Students were able to comprehend the rise and decline of the local salt industry by visiting the fishing village. During the field trip, students were asked to analyze the differences and changes of the industry in ancient and modern times. By using the narrative method with words and images, students recorded and wrote about local culture and customs. Moreover, by composing the three-line poetry with words and images on Yongan District, students hoped to preserve its culture, creating and passing down the culture of the fishing village through what they had seen and felt.

Nowadays, the main industry in Yongan District is aquaculture in fish farms. Local fish farms use “cold seawater discharge” from Yongan Liquefied Natural Gas Station of CPC Corporation, Taiwan for their fish farms. The water quality of cold seawater discharge is good after it is filtered and processed, so it is suitable for giant groupers. Yongan District uses cold electrolyzed water instead of groundwater to avoid the problem of land subsidence caused by the destruction of geology which most townships engaging in aquaculture are facing. Yongan District has found a way to enjoy prosperity in both economic development and sustainable environment. In the marine rumor buster course of the “Project on an Issue-oriented Approach to Narrative Competence Development Across Disciplines,” students taking the course visited fish farms, and they learned about the breeding, chemical use, and reproduction characteristics of local aquaculture. The course aimed to eliminate students' misconception about aquaculture, and cultivate their critical thinking abilities to comprehend fish farmers' breeding methods by comparing to what they had acquired in class. In the course, teachers taught students how to make “aquaculture for dummies,” trying to pass on correct concepts and reverse misinformation in media. The “aquaculture for dummies” enabled students to re-organize their logical thinking skills, applying their knowledge to real life.

In addition to Fengshan District and Yongan District, Cijin District in Kaohsiung City has been a region that NKUST's Department of Marine Leisure Management concerns about for a long time. Teachers often lead students to visit and explore Cijin District. They deeply know local issues and difficulties the district is facing. Additionally, they understand local marine ecology, tourism industry and cultural features. Cijin District was the earliest place

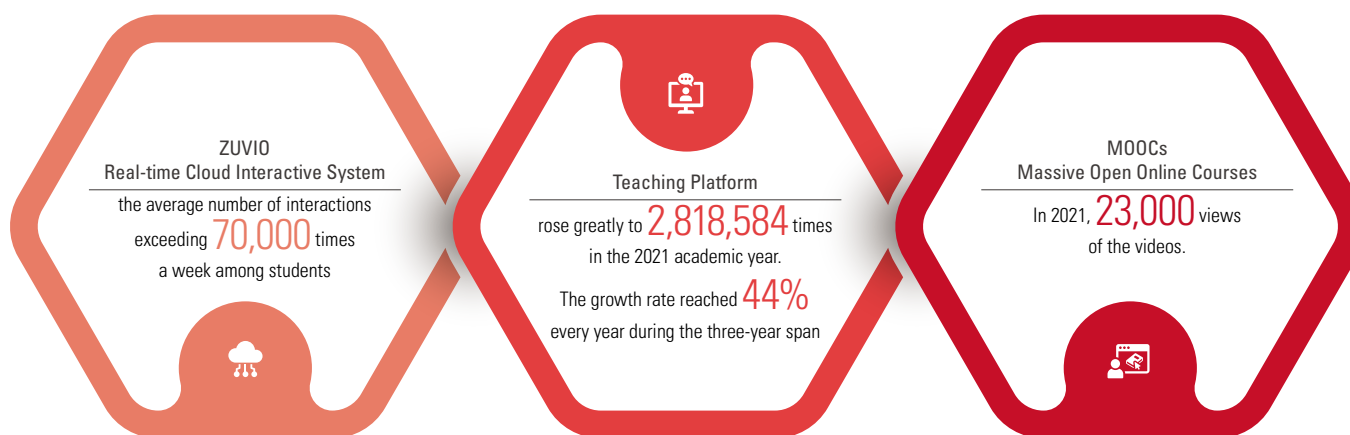
of origin of Kaohsiung Harbor. During the Japanese colonial period, many businesses gathered in this region, making it a prosperous place, and it was an important commercial port. However, due to the impact of population exodus, and the shortage of medical and educational resources caused by inaccessibility, Cijin District is a region with the slowest development in Kaohsiung. Tourism is the most renowned industry in Cijin District. However, after the field trip, teachers and students found that the tourism industry had caused great environmental pollution to local ecology. Additionally, the decline of its old streets, and forgotten historical corners were important predicaments that locals were facing. To elevate the connection between students and society, NKUST's Department of Marine Leisure Management disseminated knowledge before taking action. After teachers taught students basic knowledge, they had a field trip to the district to enable students to verify issues on the venue and their knowledge. Afterwards, students returned to the class, and they were guided to pioneer in designing diversified sightseeing routes with culture, history and coastal activities by adopting the characteristics of Cijin District to plan appropriate touring proposals for the district, or to shoot marketing films to promote it. In the course, students were inspired to think about how to strike a balance between the revival of the tourism industry and marine ecology, and to preserve the cultural and historical stories of Cijin District. During the field trip, teachers also held a beach clean-up activity along the coast of Cijin District, enabling students to realize the seriousness of marine ecological pollution in person, as well as inviting the general public who visited the coast of Cijin District that day to respond to the marine issues. Upon being involved in the issues in person, students were more willingness to learn. They gained a sense of accomplishment from the field trip, as well as applying what they had acquired towards society, not just in class.

The core value of the aforementioned course groups lay in guiding students to comprehend the issue of sustainable development, cultivating their cross-disciplinary cooperation and diversified narrative abilities to connect professional subjects with cross-disciplinary learning. Additionally, their narrative competences were the presentation of their learning outcomes. Most important of all, students have formed the cross-disciplinary and tolerant spirit through the accumulation of their learning experience.

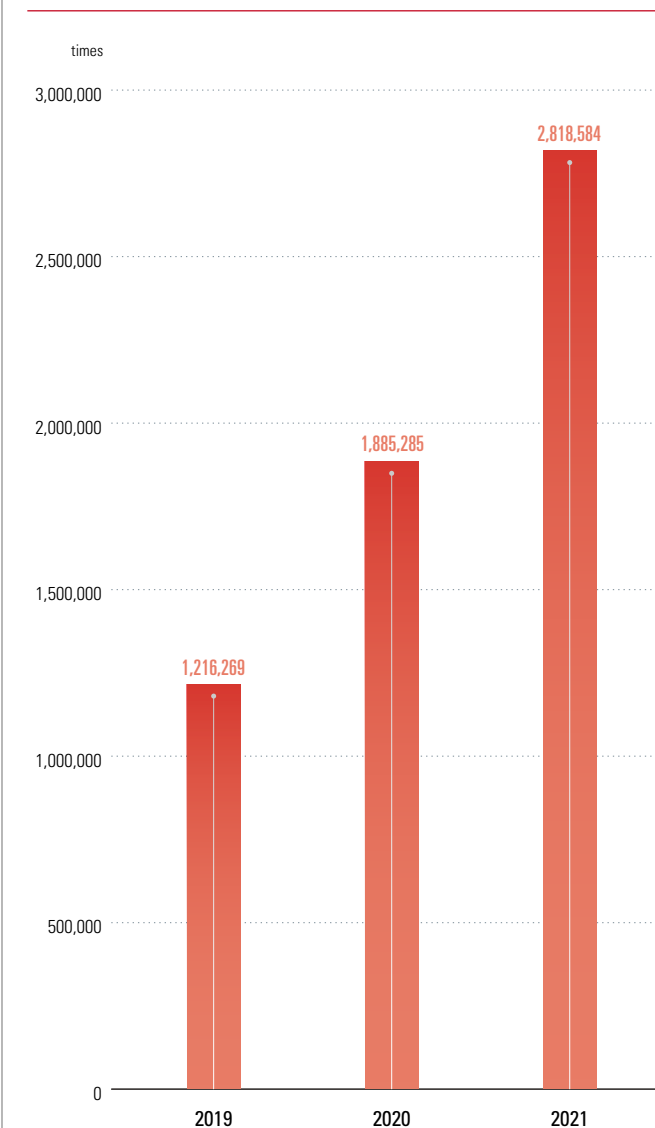
4.2 Digital and Open Courses

As learning methods are diversified nowadays, students are able to choose methods that best suit them, and teachers enjoy more space to elaborate their instruction as well. NKUST actively develops online teaching systems, including the “ZUVIO Real-time Cloud Interactive System” and the “Teaching Platform.” ZUVIO covers online quizzes, feedback and discussions, peer evaluation and student management (management functions include grouping, roll call and viewing learning statistics) with a usage rate that increases year by year. As of the second semester of the 2021 academic year, more than one fifth of the courses took advantage of ZUVIO to provide instant feedback on teaching, with the average number of interactions exceeding 70,000 times a week among students. The university has also established the “Teaching Platform” as a digital Learning Management System (LMS), providing features

such as allowing the faculty to upload the digital teaching materials, students to upload assignments, taking tests online, discussing and interacting on topics, as well as synchronizing remote learning. Since the official launch during the second semester of the 2018 academic year, the number of users per semester has increased year by year. In the 2019 academic year, the number of times the system used was 1,216,269 times, and the number increased to 1,885,285 times in the 2020 academic year, and rose greatly to 2,818,584 times in the 2021 academic year. The growth rate reached 44% every year during the three-year span. The resources for digital learning that NKUST has invested in and accumulated have brought a great effect on online learning during the COVID-19 pandemic, enabling teachers and students to carry on teaching and learning with digital technology.



☑ Number of times the Teaching Platform used over the past three years



In addition to the “ZUVIO Real-time Cloud Interactive System” and the “Teaching Platform,” MOOCs (Massive Open Online Courses) is a key teaching medium for NKUST’s curricula. MOOCs refers to “massive open online courses” which opens courses to a large number of online users through the Internet to participate in the learning process. In 2021, NKUST offered 9 MOOCs, with more than 1,490 students taking the courses, and 23,000 views of the videos. Additionally, most students thought that multimedia audio-visual materials helped their learning based on the analysis of course learning data. MOOCs got 4.2 points on the Likert Scale, with 5 points being the highest score, and showed that MOOCs has elevated students’ autonomous

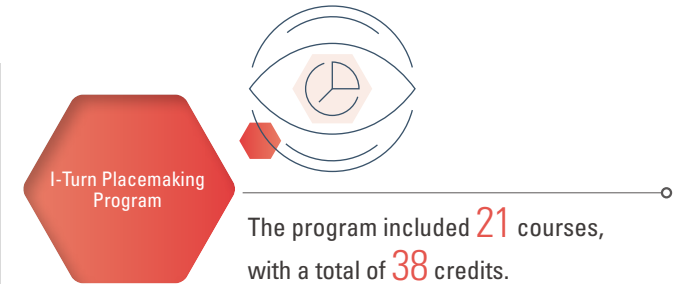
learning abilities. In 2021, NKUST, for the first time, allowed students to take online MOOCs off campus, and credits earned from these courses could be counted as the graduation credits for Liberal Arts courses. During the summer vacation of the same year, NKUST participated in National Yang Ming Chiao Tung University’s project of “Summer Online School (SOS)” to allow prospective students to study in their free time over summer, and their credits earned from the SOS project could be exempted from Liberal Arts credits after they attended NKUST. In 2021, the SOS project offered 10 courses, with 225 students participating in the online self-learning program, and it enabled students to learn autonomously with diversified methods.



▲ NKUST's online teaching systems



In 2021, the SOS project offered
10 courses,
with **225** students participating
in the online self-learning program



With respect to the curricula, NKUST’s “I-Turn Placemaking Program” responded to “talent cultivation” and “local connections,” the core values of university social responsibility, aiming at the vision of “deep plowing locally” and “taking a broad view internationally.” Through cross-disciplinary learning, the program focused on “placemaking” for students from different fields, and planned core and professional advanced elective courses to make courses connect with expertise and practice in different fields. Additionally, the program enabled students to comprehend the essence and practical operation of placemaking by implementing its concept. The cross-department and institute program integrated courses offered by the Institute of Marine Affairs and Business Management, the Department of Seafood Science, the Department of Aquaculture, the Department of Shipping and Transportation Management, the Department of Industrial Design, the Department of Business Computing, the Department of Applied Japanese, Center for the Liberal Arts, and so on. The program included 21 courses, with a total of 38 credits.



USR New
Agriculture and
Placemaking College

“USR New Agriculture and Placemaking College”

offered **30** local implementation courses and cultivated over **1,400** students, with **18** departments and institutes and 32 enterprises being engaged in.

In addition to being dedicated to planning the university's courses, NKUST focuses on cross-university and off-campus courses. Although NKUST does not have any agriculture department, the university has established the “USR New Agriculture and Placemaking College” in response to university social responsibility (NKUST's “Yanchao Placemaking with New Agriculture Project”). The college integrated general education courses, professional courses and hands-on courses to form the modular theme program of ten major new agriculture implementation issues to fortify the integration of resources for regional industry-academia collaboration, as well as engaging in the cultivation of local talents. The curricula of the college were carried out simultaneously with NKUST's courses, and cross-university teachers, industry masters, agricultural masters and local governments gave lectures in these courses. With the assistance of faculty communities and expert meetings, the college adjusted its curriculum design, introducing an innovative teaching model. To support students to acquire cross-disciplinary innovation, integration and application abilities with the learning and guidance mechanism, the unit taking charge of the project granted them the program

certificate and incorporated their learning process into their portfolios every time they completed the program. Additionally, the college recommended students to be employed by the venue to do a long-term part-time job or internship, creating employment opportunities for them. “USR New Agriculture and Placemaking College” which officially launched in the 2020 academic year offered 30 local implementation courses, and attracted 18 departments and institutes, 27 teachers, 1,433 students, 32 enterprises, and 58 industry masters to put it into practice at the venue. From basic learning, professional integration to students' abilities for future careers, the college helped deepen teachers and students' identification with the social implementation value of Yanchao District.

Air quality has been one of public issues that the general public are most concerned about in recent years. NKUST spares no effort to improve air pollution by organizing the workshop of air quality education with ASE Technology Holding Co., Ltd., National Science and Technology Museum, Taiwan Indoor Environment Quality Management Association (TIEQM), NKUST Alumni Association, and the alumni association of the Department of



A total of **35** seed instructors for air quality education

A total of **12** graduate students have obtained the certification of indoor air quality maintenance and management personnel issued by Environmental Protection Administration

Safety, Health and Environmental Engineering, and invites school teachers, environmental education personnel, and hotel owners in Kaohsiung City to attend. By integrating the issues of air pollution and news about the COVID-19 pandemic, the workshop guided participants to operate indoor air quality practice to strengthen their knowledge and practical application by interactive teaching. In response to the issues of prevention of the pandemic and the authentication of indoor air quality, the workshop shared the new pandemic prevention trend. Additionally, it combined new cleaning techniques with new pandemic prevention technologies to promote new actions against air pollution and the pandemic by integrating knowledge and technologies. A total of 35 seed instructors for air quality education have been cultivated to improve their environmental literacy and expertise in the environment, passing down air quality knowledge to the public. Moreover, NKUST was in charge of the only “training program for indoor air quality personnel” in Kaohsiung and Pingtung. Furthermore, based on new incentives formulated by Research Center for Environmental Health and Biotechnology, the Department of Safety, Health and Environmental Engineering encouraged its graduate students to take the qualification examination for indoor air quality maintenance and management personnel held by Environmental Protection Administration, Executive Yuan. A total of 12 graduate students have obtained the certification of indoor air quality maintenance and management personnel issued by Environmental Protection Administration, and they can be engaged in air quality control in the future.

4.3 Affiliated Institute of Continuing Education

In response to national economic construction and industrial and commercial development, NKUST has set up the Affiliated Institute of Continuing Education (weekend class) to provide in-service workers with the opportunities of recurrent education and lifelong learning. The institute aims to optimize their professional knowledge and practical skills, enhance manpower quality, and satisfy the manpower demand of local industries. The institute has had 43 years of history since it was established in 1979. It has been through changes and innovation several times. The faculty and staff members of the institute hold fast to their positions on weekends, fulfilling their social responsibility. NKUST's Affiliated Institute of Continuing Education has become the top and only one national institute of continuing education in Southern Taiwan.

The education system of the Affiliated Institute of Continuing Education is equivalent to the college of two-year continuing education. Students who complete required subjects and credits may be granted the bachelor's degree and awarded the certificate of degree by NKUST. With respect to admissions requirements, students who have graduated from college or above or with the equivalent academic ability, or who have graduated from senior or vocational high school for five years with relevant work experience, which was approved by the Ministry of Education in 2017, may apply for the institute. After their applications and documents have been reviewed and approved, they may be admitted to the institute. Their

length of study is at least 2 years. Courses for the institute are offered on every Saturday and Sunday in principle to let in-serve workers pursue further studies to look after both their jobs and schooling. In regard to curriculum planning, each department properly offers courses based on the current demand of national economic and construction development. Meanwhile, the departments strengthen their skill and hands-on courses to enrich students' practical experience. At present, the institute includes the 9 departments of the Department of Civil Engineering, the Department of Mechanical Engineering, the Department of Industrial Engineering and Management, the Department of Electrical Engineering, the Department of Accounting and Information Systems, the Department of International Business, the Department of Business Administration, the Department of Tourism Management, and the Department of Applied English. These departments offer diversified courses, and students may choose courses based on their aptitudes. These courses are of great help to those who intend to get a promotion or make progress at work. Furthermore, as the demand for high-end researchers in local industries has been increasing over the past few years, quite a few alumni of the institute pursue further studies at relevant graduate institutes or abroad.

Sustainability achievements of the Affiliated Institute of Continuing Education:

Implementing regulations for students to apply for minors on weekends.



Campaigning the philosophy of the weekend in-serve graduate program to elevate students' willingness to take the entrance examination and increase their chance of admissions.



Implementing regulations for auditing the weekend undergraduate program to provide the general public a channel to cultivate their second expertise.

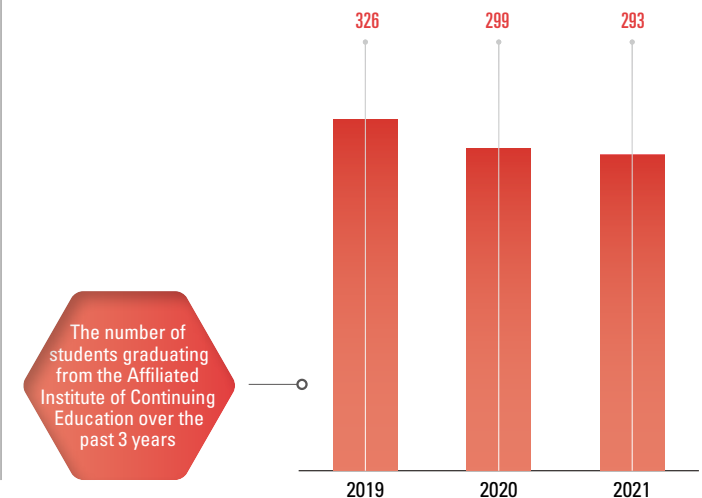


Smoothly transferring the second-year technical continuing education program (weekend class) to expand its enrollment to elevate the university's enrollment rate.



NKUST's Affiliated Institute of Continuing Education ensures to provide education to all people without discrimination, and offers fair and high-quality education, and advocates lifelong learning. Students have had great achievements in certification examinations, competitions, and the entrance examination to the graduate institutes of national universities. Additionally, the institute has student clubs which organize activities such as the welcome party of Students' Union, year-end parties, and the charity carnival on the university anniversary, and the art and literary work competitions of the School Journal Editing Club. These activities have not only enriched the school life memories of students of the institute, but also guided them to participate in charity fairs for the disadvantaged in society.

Over the past few years, society has been changing rapidly, and the educational environment is in a great reform. Therefore, the Affiliated Institute of Continuing Education adjusts its teaching content and key points to conform to society and students' needs in line with current needs and trends. Upholding the concepts of "innovation, service and care," the institute guides students to acquire both theoretical and practical skills, fortify their own competitiveness at the workplace, realize the spirit of global sustainability, and achieve the quality of a world citizen.



4.4 Quality Education with Marine Characteristics

4.4.1 Building Marine Education to Create Sustainable Environment

Actively Promoting Marine Education

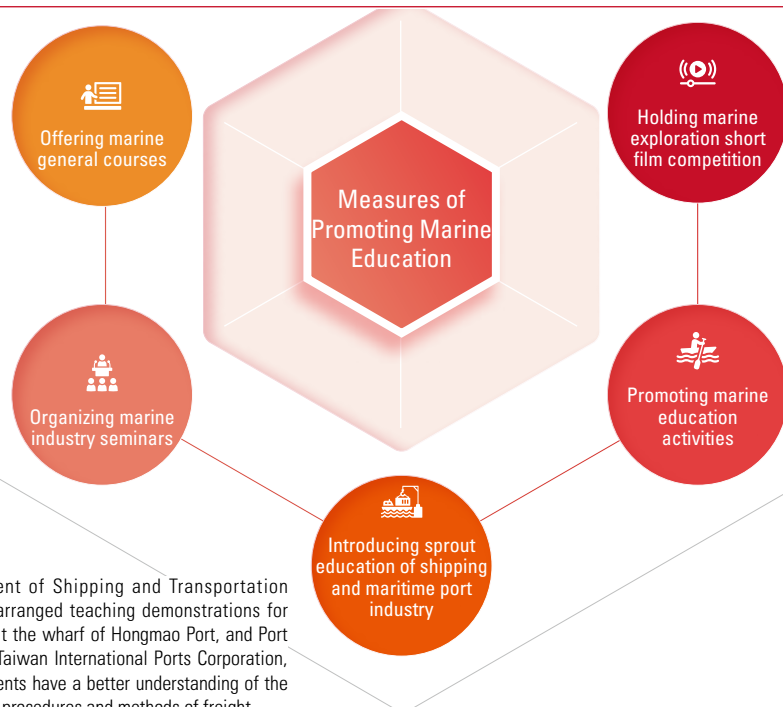
The 14th sustainable development goal of United Nations' SDGs is "to conserve and make the sustainable use of the marine ecosystem to ensure biodiversity and prevent the deterioration of the marine environment." To enhance students' marine knowledge, enable them to acquire marine knowledge, and create a wonderful marine environment to fulfill the university's social responsibility, NKUST actively promotes marine education. NKUST guides students to continue to concern about marine issues and cultivates their marine knowledge to elevate their marine awareness and foster the sustainable development and application of the ocean by offering marine general courses, organizing marine industry seminars, introducing the sprout education of the shipping and maritime port industry, promoting marine education activities, and holding the marine exploration short film competition.

🕒 Five major measures to promote marine education at NKUST

In the beginning, NKUST promoted teaching methods with 14 theme modular designs. Later, to elevate teaching quality, and improve students' needs to take the courses, the general courses have been offered with a single teaching method with 10 themes each class since the second semester of the 2020 academic year.

With the topics of marine recreation, maritime technologies, port logistics, marine biotechnology, the development of fishery, marine environment, and the added value of aquatic products, NKUST invited experts and scholars in the marine fields to give lectures, and deliver speeches on marine characteristics on a regular basis.

The Department of Shipping and Transportation Management arranged teaching demonstrations for students to visit the wharf of Hongmao Port, and Port of Kaohsiung, Taiwan International Ports Corporation, Ltd. to let students have a better understanding of the actual shipping procedures and methods of freight.



NKUST encouraged students to make the good use of audio and video tools, and integrate marine issues. The competition inspired students' learning motivation for new marine knowledge and improved their logical thinking skills through discussing issues and finding solutions to improve them. Additionally, it aimed to expand their cross-disciplinary integration and innovation abilities.

Teachers of the marine fields held marine education activities in line with food and fisheries education, marine culture experience, water safety education, marine sports experience, popular marine science and so on. The activities were mainly hands-on activities and outings.



Offering Marine General Courses

In the initial stage of the merger of the three universities, NKUST's general courses on the exploration of marine technologies adopted teaching methods with 14 theme modular designs. Later, to elevate teaching quality, and improve students' needs to take the courses, the general courses have been offered with a single teaching method with 10 themes each class since the second semester of the 2020 academic year. The number of classes and number of students taking the courses have increased since then. In the 2020 academic year, a total of 27 general courses on the exploration of marine technologies were offered, with a total of 2,057 students taking these courses. The courses offered in different programs and on different campuses between the 2018 academic year and 2020 academic year are as follows:



27
general
courses
2,057
students
taking
these
courses

📌 Statistics of number of students taking general courses on the exploration of marine technologies in the 2018-2020 academic years

Academic Year	Number of Classes	Campus	Number of Students
First semester of 2018 academic year	6	First Campus, Nanzih Campus; Cijin Campus	506
Second semester of 2018 academic year	8	First Campus, Nanzih Campus, Yanchao Campus; Jiangong Campus	567
First semester of 2019 academic year	10	First Campus, Nanzih Campus, Yanchao Campus, Jiangong Campus; Cijin Campus	682
Second semester of 2019 academic year	9	First Campus, Nanzih Campus, Yanchao Campus, Jiangong Campus; Cijin Campus	671
First semester of 2020 academic year	12	First Campus, Nanzih Campus, Yanchao Campus, Jiangong Campus; Cijin Campus	893
Second semester of 2020 academic year	15	First Campus, Nanzih Campus, Yanchao Campus, Jiangong Campus; Cijin Campus	1,164
Total			4,483

Organizing Marine Industry Seminars

With the topics of marine recreation, maritime technologies, port logistics, marine biotechnology, the development of fishery, marine environment, and the added value of aquatic products, NKUST invited experts and scholars in the marine fields to give lectures and deliver speeches on marine characteristics on a regular basis through the instructors of marine general courses. A total of 39 speeches were held in the 2020 academic year, with a total of 2,477 participants.



39
speeches
2,477
participants

Introducing Sprout Education of Shipping and Maritime Port Industry

Moreover, in order to introduce the sprout education of the shipping and maritime port industry through NKUST's marine specializations, the Department of Shipping and Transportation Management arranged teaching demonstrations for students to visit the wharfs of Hongmao Port, Port of Kaohsiung, Taiwan International Ports Corporation, Ltd., Kao Ming Co., Ltd., Hong Ming Terminal and Stevedoring Corp., YES Logistics Corp., and ETMall Logistics Corp. to give students a better understanding of actual shipping procedures and freight methods. Additionally, they learned about the collaboration between different organizations which allows for logistics to operate smoothly.



▲ The Department of Shipping and Transportation Management held teaching demonstrations and visits to the shipping and maritime port industry.



Promoting Marine Education Activities

Marine education demands immediate attention. NKUST's teachers in marine fields held marine education activities in line with food and fisheries education, marine culture experience, water safety education, marine sports experience, popular marine science, sprout education for the international logistics and transportation industry, marine environment and ecological education, marine maker education, and so on. The marine education activities, mainly hands-on activities and outings, enabled students to learn by doing and do by learning, and encouraged event participation among students. A total of 36 marine education activities were held in the 2020 academic year, with a total of 2,693 students participating.



36
marine
education
activities
2,693
students
participating

**Marine
Education
Activities**

NKUST's Department of Marine Leisure Management held an ecological experience activity in the intertidal zone in Changhua County's Fangyuan Township to allow everyone experience the sea cattle culture. The Erlin River estuary in Fangyuan Township has the largest intertidal wetlands in Taiwan. The mud flat, stretching as far as the eye can see, is 6 kilometers long, and the area of its mangrove is up to 27.6 hectares, making it a precious ecological treasure house. The unique "sea cattle culture" in Fangyuan Township, Changhua has been registered the "national treasure-level" intangible cultural heritage. Nowadays, cattle are rarely seen in Taiwan's countryside. At the beach in Fangyuan Township, cattle shouldered the great responsibility of transporting oysters for oyster farmers back in the early days. However, the sea cattle culture has transformed into a sightseeing highlight. Tourists can take cattle-pulled carts and enjoy ecology in the intertidal zone.

NKUST's Office of Marine Science and Technology cooperated with Shuangchun Elementary School to teach the school's teachers and students how to make their own micro-observation ecological bottles, enabling them to learn about the aquatic cultivation concepts, an overview of the aquatic industry, and the manpower needed for the industry. By building their own ecological aquariums, teachers and students learned together to observe the forms and characteristics of aquatic creatures. This activity taught them to respect all living creatures and cultivated their conceptualization of ecological conservation. 34% of activity participants were elementary school teachers, with 66% of them being elementary school students.

NKUST's Department of Marine Leisure Management tried holding a remote-control sailboat workshop for reserve coaches. By integrating "speed" and "power" in the sailing activity, the workshop taught students about the structure of sailboats, sailboat steering skills, remote-control sailboat models, and different kinds of competitions. Additionally, it enabled students to know about the developmental trends of the marine leisure industry. Moreover, the department hoped to train college students in becoming seed coaches for marine education activities held in elementary schools and junior high schools through the "Small Hand in Big Hand, Together We Swim in the Ocean" remote-control sailboat experience activity, helping college students deepen their understanding of social responsibility.



▲ Ecological experience in Fangyuan Township's Intertidal Zone



Ecological
experience
in Fangyuan
Township's
Intertidal
Zone



micro-
observation
ecological
bottle



▲ After Shuangchun Elementary School teachers learned about aquatic ecology, they guided students in making micro-observation ecological bottles.



The reserve
coach remote-
control sailboat
workshop



▲ The reserve coach remote-control sailboat workshop taught students about sailboats, guiding them in learning about the marine industry.

Holding Marine Exploration Short Film Competition

To encourage students to make the good use of audio and video tools, and integrate marine issues, NKUST's Office of Marine Science and Technology held its "Salute the Ocean—Marine Technology Exploration Short Film Competition" in May 2021 to inspire students' learning motivation for new marine knowledge and improve their logical thinking skills, as well as expanding their cross-disciplinary integration and innovation abilities through discussion of issues and finding solutions to improve them.

Students signed up for the competition by teaming up with 2 to 5 current students from different colleges on each team. A total of 13 teams passed the primary review in mid-June. The 13 teams made films and uploaded them. NKUST's Office of Marine Science and Technology invited 4 experts and scholars on campus and off campus to judge their works with the 4 indicators of "theme appropriateness," "presentation of the content," "value and application," and the "editing and rearrangement of incidental music and visual design." The top prize to the third prize were given to one team each and 4 teams were given honorable mentions, with a total of 7 teams receiving awards.



13 teams passed
the primary review
The top prize to the
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▲ Office of Marine Science and Technology held its 2021 "Salute the Ocean—Marine Technology Exploration Short Film Competition."



Moreover, NKUST's "Regional Revitalization in Coastal Credit Program" focusing on "regional revitalization in the coastal area" attempts to transform "talent building" and "sustainable teaching venues" into a series of credit courses, and to cultivate students with abilities in marine knowledge, information application, design, project planning, and business to possess comprehensive capabilities for "regional revitalization in the coastal area." The learning path can be divided into the three stages of a basic stage, professional stage, and practical application stage. In the basic stage, the program helps learners build up concepts of "regional revitalization" and "global sustainability." The core philosophy of the professional course equips students not majoring in the field with professional cross-disciplinary abilities, including abilities in design, information application, and project planning. Upon completion of the basic and professional courses, the practical application course will introduce the connection and application of practice to help learners put the concepts of the basic and professional courses into practice.

NKUST continues to promote marine education. The diversified education modes are not just for students of the university. The general public can also participate in these events to protect our wondrous oceans. NKUST hopes that marine awareness can be blended into our daily life naturally, and that we can timely do our part to safeguard the ocean.

Open Water Sports Education Center Promotes Demonstration Program

In 2020, to continue to deepen students' aquatic sports experience and to emphasize "water safety education" when engaging in aquatic sports, the Sports Administration of the Ministry of Education cultivated students' abilities to familiarize themselves with open water such as oceans and lakes, and their emergency response abilities, further promoting the "Demonstration Program Promoted by Water Sports Resources Center." NKUST was commissioned by the Ministry of Education to execute the demonstration program, plan, and construct a "Water Sports Resources Center," try to promote aquatic sports for students of all educational levels, and fortify the comprehensive learning of sports skills, water safety, and marine education. Furthermore, in response to the "Salute the Ocean" policy proposed by Executive Yuan, NKUST organized aquatic sports events to help students learn more about the ocean through athletics in the hope that students could familiarize themselves with the ocean and enjoy it safely, and that their literacy and abilities in aquatic sports could be cultivated.

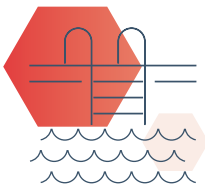
The cooperative project first established a planning and promotion task force for planning the construction of the promotion center. Next, NKUST completed the planning of aquatic sports promotion strategies in different regions as follows:

1. Organized the "Leaders by the Ocean" aquatic experience camp to connect different level schools in each region.
2. Organized aquatic experience activities for students, fortified their water safety knowledge and skills to promote aquatic sports.
3. Completed an aquatic sports vessels usage survey at Taiwan's schools sponsored by Sports Administration in 2020.
4. Developed a safety checklist for non-powered vehicles that students filled out at aquatic events.
5. Developed a self-evaluation form for students before they engaged in aquatic activities.

Next, NKUST constructed 5 Aquatic Sports Resources Centers in Northern Taiwan, Central Taiwan, Southern Taiwan, Eastern Taiwan, and on Outlying Island. Last but not the least, NKUST set up an information platform for the centers to promote and display activity results. Information relevant to the Open Water Sports Education Center can be found on the [Open Water Sports Education Center Facebook page](#) of the Sports Administration of the Ministry of Education.



Forward-looking aquatic sports activity held by Penghu Guanyin Temple in 2021



NKUST held **34** marine education events in the 2020 academic year, with a total of **2,693** people participating.



Open Water Sports Education Center Facebook page of the Sports Administration of the Ministry of Education



4.4.2 Connecting with Industries to Achieve Mutual Benefits

Serving as the largest university of science and technology in Taiwan, NKUST excels in industry-academia collaboration and internship integration which are obvious to all. The university's sustainability highlights can be described from the aspects of its professional courses, cross-disciplinary environmental education, and talent cultivation platform.

Offering professional courses to connect with industries



Due to differences between industrial features and technical needs, there is always a gap between students' technical skills cultivated at school and the practical demands of enterprises. Therefore, industrial instructors teach techniques relevant to industries with thematic, problem-based learning in industrial courses along with practical learning at factories, and internships during semesters. By integrating theory with practice, students are capable of solving practical problems they might face when on the job. Moreover, NKUST cultivates students based on their expertise to achieve its goal of connecting with industries.

Promoting cross-disciplinary/cross-division environmental education



The Center for Energy Research on the First Campus of NKUST obtained certification from an environmental education institution in 2012. The center actively cooperates with environmental education facilities and venues in Southern Taiwan to integrate and apply sufficient environmental education resources locally, and to promote environmental education in cross-disciplinary, cross-public-and-private-sector enterprises and divisions. The center has cooperated with ASE Cultural and Educational Foundation since 2016, and with Cleanaway Group since 2018 to promote environmental education in enterprises that engage in industry-academic collaboration. In the early phase, the center planned the visiting routes of the companies and lesson plans. Next, the center trained seed instructors, and promoted environmental education at school, passing down ideas of sustainable development to each learner. In 2021, the center even promoted environmental education to the Greater Gangshan District and Greater Cishan District, influencing over 500 people. Meanwhile, the center turned its content into lesson plans and teaching aids.

In 2021, NKUST's cross-disciplinary/cross-division environmental education was promoted to the Greater Gangshan District and Greater Cishan District, influencing over **500** people. Meanwhile, NKUST developed relevant lesson plans and teaching aids for it.

In 2021, a total of **23** students graduated from "Industry College of the Ministry of Education—Talent Cultivation Program for Marine Engineering Industry," and directly worked at major container liner shipping companies.

Training on cross-school platforms



Integrative resources on "Gloria South," a global research and industry alliance formed by 10 universities and colleges in Central and Southern Taiwan, and the Ministry of Education's talent cultivation platform coupled with Shalun Green Energy Science City, Southern Taiwan Science Park, Qiaotou Science Park, Circular Economy Park and other key industrial settlements to connect with the working circles of steel and metal, green wind power, and ocean technology to create an industry-academic ecosystem, building up industrial capacities, continuous academic research, and a profound cooperation model in the S Corridor in Southern Taiwan.

Deploying 5G forward-looking cooperation and talent cultivation

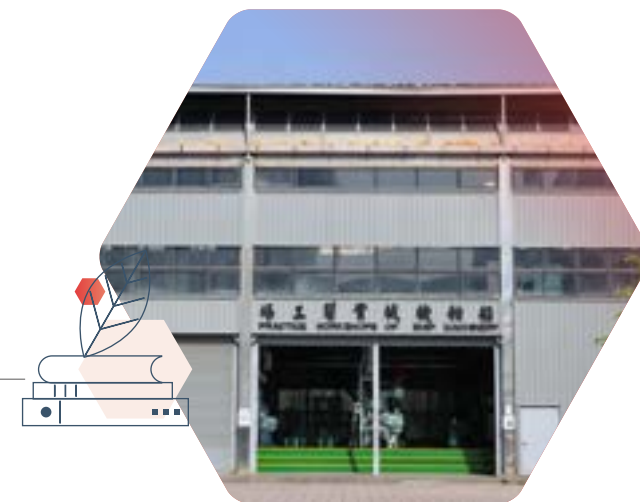


NKUST has cooperated with the Institute for Information Industry to promote the "5G Jump Project" organized by the Industrial Development Bureau, the Ministry of Economic Affairs to help the Institute for Information Industry to match companies in Southern Taiwan with companies in the Asia New Bay Area — 5G AIoT, and guide industries to assign a topic featuring the R&D of 5G commercial products with "Talents Solve Problems Given by Industries." Additionally, talents are recruited to join the actual competition with the method of doing an internship at enterprises to accelerate the development of critical talents in the 5G industry. Moreover, NKUST has assisted the Institute for Information Industry in offering customized courses for enterprises by integrating industry-academia-research and public associations in the field to plan the "5G Training Course for Customized Corporate Technical Learning," in line with the 5G forward-looking techniques and training needs of industries to build the correct cognition of industries regarding 5G forward-looking techniques and industrial trends while reserving internal talents for enterprises.

Fortifying ocean features to exalt the philosophy of sustainability



The Department of Marine Engineering of NKUST has cooperated with Yang Ming Marine Transport Corp., Hermandad Shipping Agency, All Ports Transportation Co., Ltd., U-Ming Marine, Wan Hai Lines Ltd., China Steel Express Corporation, SAMYOGA Marine Co., Ltd., and Hung Hua Construction Co., Ltd. to organize an "Industry College of the Ministry of Education — Talent Cultivation Program for Marine Engineering Industry." The professional skills and language abilities of students are strengthened step by step in their senior year. In the second semester of their senior year, students engage in a practical internship at sea. Additionally, they are guided to obtain their STCW, IMO and BST certificates, and basic safety training certification for sailors. In 2021, a total of 23 students were directly employed by major container liner shipping companies upon graduation, becoming genuine "ocean newbies." The program provides a channel to elevate the value of ocean technology industry and cultivate a stable ocean technology talent cultivation channel for the country and industries.



Professional Maritime Training and Cultivation of Offshore Wind Power Talents

NKUST has set up Maritime Training Center (hereinafter referred to as MTC), and the university is the only maritime school in Taiwan with an exclusive wharf. The total length of the wharf is 105 meters, with a gross tonnage (GT) of approximately 6,000. The MTC has also laid the foundation for Taiwan's maritime education. The MTC possesses all kinds of professional maritime training equipment. The MTC organizes over 30 types of training for merchant ship crew such as basic safety, the operation of lifeboats and rafts and rescue boats, electronic navigation chart (ENC) simulators, and 11 types of training for fishing boat crew such as marine engineering officers on fishing boats, and positions for fishing navigation.

In addition to training crew members for merchant ships and fishing boats in line with government's policies, NKUST integrates government learning resources to smoothen the professional training and learning channels for NKUST's students and students from the vocational colleges of the maritime strategy alliance to elevate the percentage of students obtaining professional training certificates at school, realizing the goal of being employed right after graduation. Moreover, in response to the cultivation of shipping talents in Taiwan, and the demand for offshore wind power when the government develops the green energy policy, NKUST provides a variety of professional training services for maritime talents as follows:

To assist the students of marine departments (such as the Department of Marine Engineering, and the Department of Shipping Technology) at NKUST to complete various types of professional training for merchant ship crew by integrating the training into formal courses, and to obtain training certificates at school to realize the goal of being employed right after graduation. About 1,400 students on average participate in the training every year.

To help the students of maritime vocational schools (such as National Tung Gang Maritime and Fishery Vocational High School, the National Tainan Senior Marine Fishery Vocational School, and National Penghu Marine and Fishery Vocational High School) complete professional training for merchant ship crew, and do an internship on board a ship to accumulate their professional skills and experiences. About 650 students on average participate in the training every year.

In response to the cruise ship tourism policy promoted by Taiwan's government, NKUST provides 2 kinds of professional training for crew members, including basic safety and security consciousness. Students who complete the training, and pass the qualification test may obtain the crew member brochure and professional training certificate. They may start working on board a ship after graduation. NKUST will plan on integrating the training into formal courses to help more students obtain the certificate at school. The departments of tourism and food and beverage of other schools have proposed their needs for the training to NKUST.

NKUST helps the government promote coastal tourism, recreational activities and other marine business, and offers training for business motorboat navigators. NKUST gives students who are interested in obtaining the professional certification promotions and provides them with a professional training environment and equipment. NKUST is helpful for the policy of national ocean development. In 2019, NKUST purchased a motorboat (NKUST Maritime Training No.2). NKUST has offered 10 teacher training classes, and 10 student training classes each, with a total of 154 participants. The training subjects include teachers and students of Jiangong Campus, First Campus, and the Yanchao Campus (the non-marine campuses). Additionally, NKUST plans to offer the second-phase business motorboat training program this year (2023) to enable teachers and students of other campuses to learn about NKUST's marine features of with the experiential certification course, and to help them obtain the professional certificate.



In response to the development of the renewable energy policy in Taiwan, NKUST made every effort to promote the training program for offshore wind farm professionals, and to recommend that the faculty receive training in wind power training centers abroad, obtain professional training GWO-BST²⁹ and GWO-BTT³⁰ certificates, and become seed instructors at NKUST. In 2020, NKUST officially launched its GWO-BST training for wind power industry personnel, and in 2021, the university officially started the GWO-BTT training, providing diversified employment channels for NKUST's students. So far, NKUST offered 4 GWO-BST training programs for its teachers and students, with a total of 48 people participating, and 4 GWO-BTT training programs, with a total of 36 people participating.

29. The basic safety training of Global Wind Organization (GWO) includes 5 modules of First Aid, Manual Handling, Working at Heights, Fire Awareness, and Sea Survival.

30. The basic skills training of GWO includes 3 modules of Mechanical Module, Electricity Module, and Hydraulic Module.

Moreover, to meet society's needs, NKUST is dedicated to cultivating high-end experts, including offering training and the issuance of certification for other units, and developing training programs for offshore wind power industry personnel and so on. Detailed explanations are as follows:

NKUST is commissioned by industries or government agencies with maritime training needs to offer various training programs and issue certificates, such as professional training for merchant ship crew members commissioned by Maritime Port Bureau, Ministry of Transportation and Communications, and domestic major shipping companies; the pre-employment training program for navy commanders to operate the ship simulator, basic and advanced training for fishermen entrusted by the Fisheries Agency, Council of Agriculture of the Executive Yuan, cultivating workforce with academic and practical training for the government, and offering the business motor boat navigation training program. Over 5,000 people on average participate in the training programs at NKUST every year.

NKUST assists Taiwan's crew members in obtaining the certificate in domestic and foreign institutions, enabling crew members to work smoothly on ships or ship routes of different nations.

In response to the development of the green energy policy in Taiwan, NKUST actively develops the training program for offshore wind power industry, and provides additional high-quality and diversified training services for maritime personnel. Since 2015, relevant industries and units have commissioned NKUST to offer basic safety training programs for marine operations. NKUST's Maritime Training Center was authorized and qualified by the Global Wind Organization (GWO) in 2019 to be able to issue the certificate. In 2020, NKUST started offering complete GWO-BST training service, helping learners obtain the international certificate, and engage in the offshore wind power industry. Since training began in February 2020, NKUST has trained 1,573 people for 40 wind power companies. NKUST helps learners obtain the professional maritime certificate successfully and directly join the offshore wind power industry right after the end of the training

In response to the development of the offshore wind power industry, NKUST assists the Ministry of Transportation and Communications and Fisheries Agency to execute the project of changing merchant ship and fishing boat crew members' profession.

NKUST actively expands its cooperation opportunities with public and private maritime units. To make its professional maritime training keep pace with the times, NKUST has established the Development Advisory Committee, and invites experts and representatives from the industry-government-academy circles to serve as commissioners. The advisory committee is convened on a regular basis, and commissioners provide professional suggestions regarding the standards of professional training courses regulated by international covenants, the discussion and planning of professional training programs, the planning of replacement and purchase of training equipment, and of function upgrade, the cultivation of professional instructors, and the long-term development plan for the affairs of Maritime Training Center to promote and develop training at NKUST.



5

CHAPTER Sustainable Campus

5.5
Waste

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Campus
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5.1
Smart Campus
Technologies

5.1 Smart Campus Technologies

Technology and digitization have become inseparable parts of modern life in the information age. Coupled with the impact of the COVID-19 pandemic, digital transformation has also become one of the most critical issues in recent years. Under these circumstances, NKUST started thinking about how to enhance the level of convenience, safety and energy consciousness through digital technology on campus.

In recent years, NKUST has aimed to evaluate, research, and develop six major projects: energy management, campus safety, transportation, convenient life, electronic administration, and smart communications. These projects are crucial in developing smart campuses while providing all faculty members, students, and administrative divisions faster services on campus through IoT devices, cloud-based and digital models. The above constructions have also solved the issue of geographical distances among different campuses, as well as reduced unnecessary waste and carbon emissions. The improvement of efficiency in all aspects moreover achieves the benefits of energy saving and carbon reduction.

A smart campus is the manifestation of technology and life that will continue to improve over time. Additionally, NKUST will continue to introduce new digital tools to fulfill the ideal outlook of a future campus that is both convenient and user-oriented.

Smart campus technologies



Smart classroom and meeting room management system

- ◆ The system has solved the issue of access control for general classrooms and meeting rooms.
- ◆ The power management system integrates with smart schedule management, and power is turned off when there is no class to avoid energy waste.
- ◆ The system can control and record power supply for lights, air conditioning and other devices.
- ◆ In 2021, a total of 244 classrooms and 15 meetings were installed with the system.



Cross-campus surveillance integration system

- ◆ Between 2021 and 2022, NKUST executed the "Project of Replacement and Installation of Cross-campus Video Cameras and Integration of Monitor Server System" to integrate monitored images and smart invasion and lingering detection on five campuses.
- ◆ The system with a single entrance and user interface enables the manager to monitor images in a long distance anytime and anywhere.
- ◆ The system automatically reports faults to the manager.
- ◆ The system provides the function of automatic inspection for monitored images. Each inspection saves 2 hours on average and saves up to NT\$800,000 of maintenance fee every year.



Parking space indicator system

- ◆ The system records the number of remaining parking spaces, and simultaneously uploads the information to the LCD smart bulletin board outdoors.
- ◆ The system effectively reduces fuel consumption and time wasted on driving around, looking for a parking space. It is estimated that carbon emission will be reduced by 322 kg/day³¹.
- ◆ In addition to enhancing the use and efficiency of a parking lot, the system minimizes the danger of vehicles and pedestrians encountering.

Energy
Management 


Campus
Safety

Transportation 

Six Major
Aspects

31. The amount of carbon emissions was based on the emissions of 1.15E-001kgCO₂e per vehicle per kilometer. In March 2022, an average of 1,400 vehicles went into the First Campus and Jiangong Campus, presumably driving around the campuses for 2 kilometers.



Convenient
Life

Six Major Aspects



Electronic
Administration



Smart
Communications

- ◆ Faculty and students can pay administrative charges with diverse mobile payment methods at Smart Cloud iPOS System developed by NKUST.
- ◆ The system automatically arranges the order of documents. Upon the confirmation and verification of the personnel in charge in the General Affairs Division, the system automatically prints out the application and other documents. Students receive the automatic notice and claim their documents on-site. The documents may be mailed to the applicant. The complete automated procedure is more efficient, greatly reducing the waiting time.



Smart Cloud
iPOS System

- ◆ Faculty, staff, and students may apply for the access of activity vehicles to the campuses, the hanging of banners, advertisements on multimedia monitors, the reimbursement of the air conditioning card and parking permit, and many other general affairs through the system.
- ◆ In 2021, the application for the “cancellation of vehicle violation records for faculty, staff and students” and for the “advertisements on the bulletin board” was added.
- ◆ The electronic sign-off procedure replaces the paper sign-off method to enhance administrative efficiency.



Functions of
new version of
affairs application
system

- ◆ To avoid any damage to paper copies and increase their storage life, student enrollment information is digitized and scanned, and stored in the digitization system for paper documents.
- ◆ The system enables different general affairs divisions to review student enrollment information, and it helps reduce the time of searching for paper documents, enhancing the entire administrative efficiency.



Enrollment
information
viewing system

- ◆ Between 2018 and 2021, the renewal and connectivity of telephone systems, and the replacement of telephone exchange equipment were completed on all five campuses.
- ◆ The integration helps maintain speech stability even though there are frequent telephone calls among the five campuses.



Cross-campus
exchange system
integration



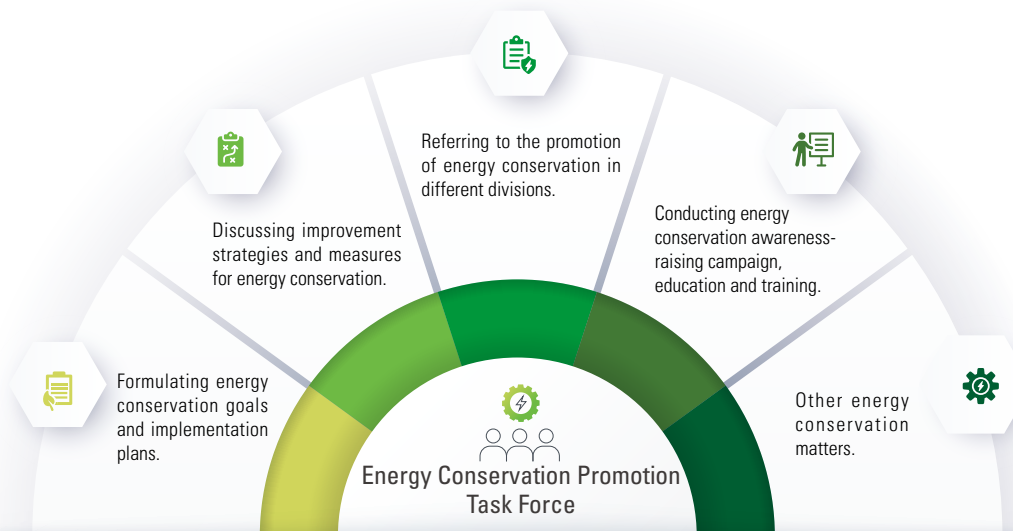
Through technological management, the smart meeting room and classroom management system helps reduce operational costs from manpower, time, electricity, space and paper, and save up to **NT\$4.4 million** every year. In addition to elevating electricity safety by evaluating electricity use in each venue, the smart system can carefully record the length of time personnel stay at a location to maintain safety.

5.2 Greenhouse Gas and Energy

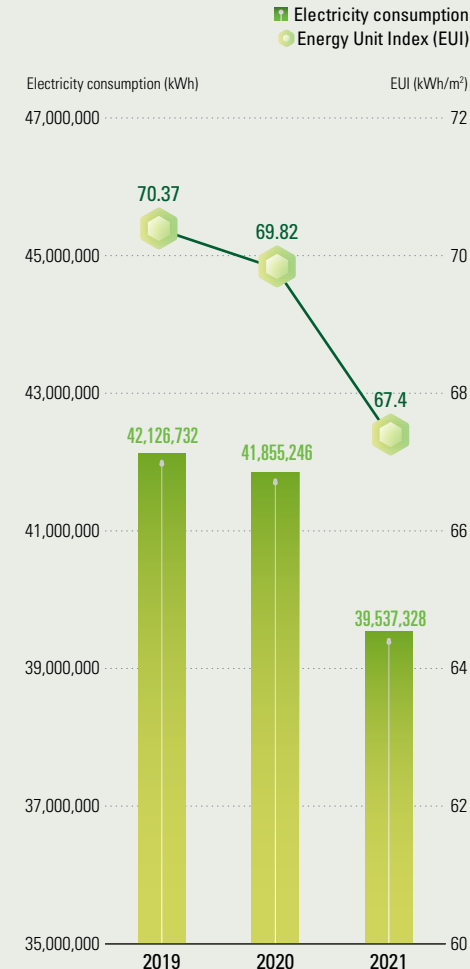
With the trends of global climate change and limited resources, countries around the world are developing awareness of environmental protection, leading to the rise of green and shared economies such as energy saving, low carbon, and recycling. As a global citizen, NKUST must carefully consider how to introduce the idea of green campus to other educational fellows through effective actions so that faculty and students can lead to a low-carbon lifestyle. In the meantime, the university takes advantage of the spacious campuses to maximize ecology and natural landscape, actively encouraging the concept of environmental protection.

Energy Conservation Policy

NKUST has continued to strive for energy conservation goals with implementation plans, lowering energy consumption through measures such as controlling central air-conditioning, replacing energy-saving lamps and transformers, and introducing renewable energy. Statistics on energy consumption over the past 2 years are the best proof of concrete actions the university took in 2021. Meanwhile, statistics show a 5.54% decrease in total energy consumption in 2021 compared with 2020, illustrating the effectiveness of energy saving. To promote the effective use of energy on campus, NKUST set up an "Energy Conservation Promotion Task Force" in 2021 to improve the effectiveness of energy conservation, and create a sustainable smart campus. The concrete actions of the task force are as follows:



✓ Energy consumption and consumption indicator (EUI³²) over the past 3 years



✓ Greenhouse gas emissions over the past 3 years

Unit: Metric tons of CO₂e



32. EUI stands for Energy Unit Index. The floor area of the building is 590,851 square meters.

33. Scope 1 refers to direct greenhouse gas emissions from manufacturing processes or facilities. NKUST could only provide greenhouse gas emissions from the fuel consumption of official cars, but could not provide the data of refrigerant emissions from air conditioners and drinking fountains.

34. Scope 2 refers to indirect greenhouse gas emissions from the use of power or steam.

Green Energy Transportation

Taxi Carpool Project

NKUST cooperates with Transportation Bureau of Kaohsiung City Government to provide students with convenient, comfortable, and money-saving transportation service, enhance their willingness to take public transportation, reduce the frequency of car accidents among students, and improve the safe transportation environment on campus, as well as effectively using resources. Therefore, NKUST has set up the taxi carpool project with fixed rates on the First Campus and Yanchao Campus. The taxi service stations (the locations of taking the taxi) are in front of Lequn Building and Jingye Building on the First Campus, and in front of First Management Building, student dormitory, the College of Humanities and Social Sciences, and 7-11 Convenience Store on Yanchao Campus. Students can take the taxi on campus. The project has been made to provide faculty and students a safe, direct and money-saving taxi carpool service. NKUST hopes that students take the taxi more often, and ride the scooter less often to create a safe campus environment with “zero incidents and zero distance.”



First Campus

Taxi service stations in front of Lequn Building and Jingye Building on the First Campus



Yanchao Campus

Taxi service stations in front of First Management Building, student dormitory, the College of Humanities and Social Sciences, and 7-11 Convenience Store on Yanchao Campus



Public Bicycles on Campuses

As Yanchao Campus and the First Campus are spacious, courtesy bicycles are provided for faculty members and students. Moreover, these bicycles are maintained and repaired by designated personnel.



Public bicycles on campus ▶



Rental of YouBike2.0 Public Bicycles

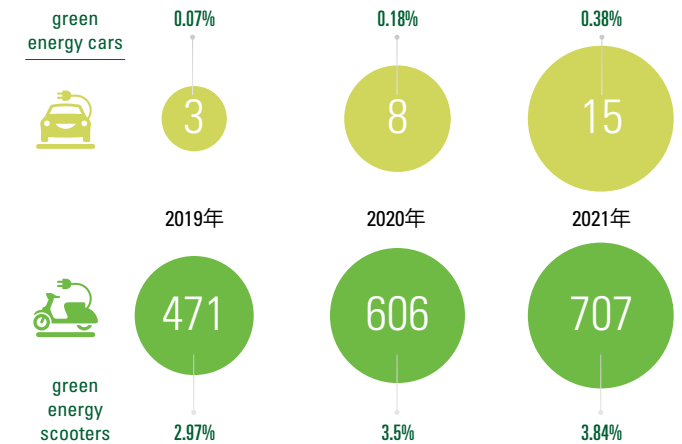
There are five rental stations of city public bicycle "YouBike2.0" on the First Campus. They are available for people to commute between campuses and for the public who come to NKUST for business. The locations of the rental stations are by the East Campus main entrance, at the back of the library, across from the third parking lot, next to the West Campus swimming pool, and on the pavement of the female students' dormitory. NKUST's faculty, staff and students can rent a city public bicycle with their faculty/staff ID card and student ID card with the function of "iPass electronic tickets," which makes rental more convenient.

◀ Rental of YouBike2.0 public bicycles on campus

Percentage of green energy transportation and sustainable commuting methods

Type of Vehicles on Campus	Total Number	Number of Electronic Vehicles
Shuttle bus (Official car)	14	0
Car	3,954	15
Scooter	18,433	707

Sustainable Commuting Method	Number
Number of times public transportation taken ³⁵	173,333
Number of bicycles applied	478
Number of courtesy bicycles on campus	510



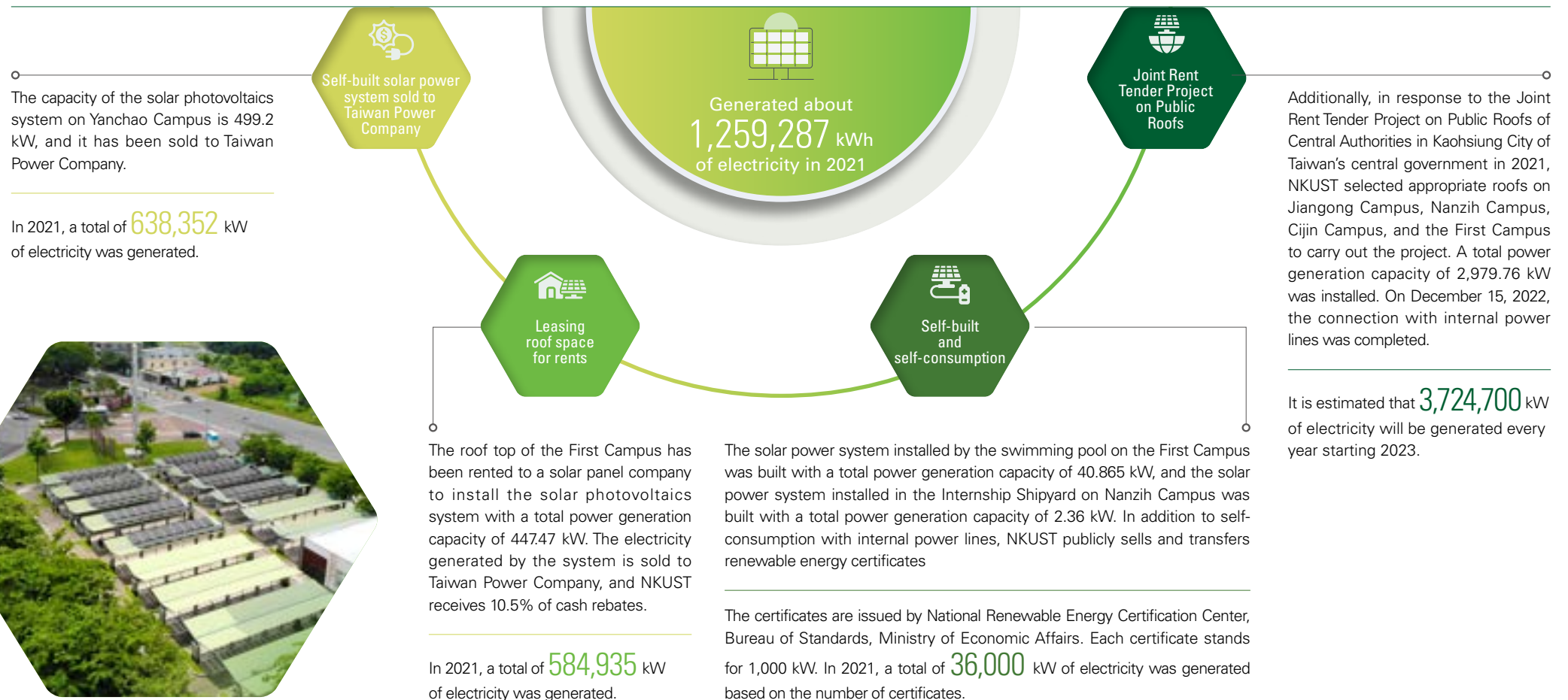
The number of green energy cars and scooters greatly increased to 15 cars (0.38%) and 707 scooters (3.84%) in 2021 from 3 cars (0.07%) and 471 scooters (2.97%) in 2019, and 8 cars (0.18%) and 606 scooters (3.5%) in 2020.

35. The number of times included the total number of people taking vehicles, and the bus of "7C Jiachang Stop—NKUST (Yanchao Campus)" into the campus.

5.3 Solar Power

In accordance with the “Renewable Energy Development Act,” the power generation equipment utilizing renewable energy is aimed at over 27GW in 2025. Bureau of Energy, Ministry of Economic Affairs, has planned the long-term solar photovoltaics system installation goal to reach 20GW in 2025, with 6GW from the roof PV system, and 14GW from the ground-mounted PV system, in accordance with the “2020 Goal Achieving Project 6.5GW Solar Photovoltaics System.”

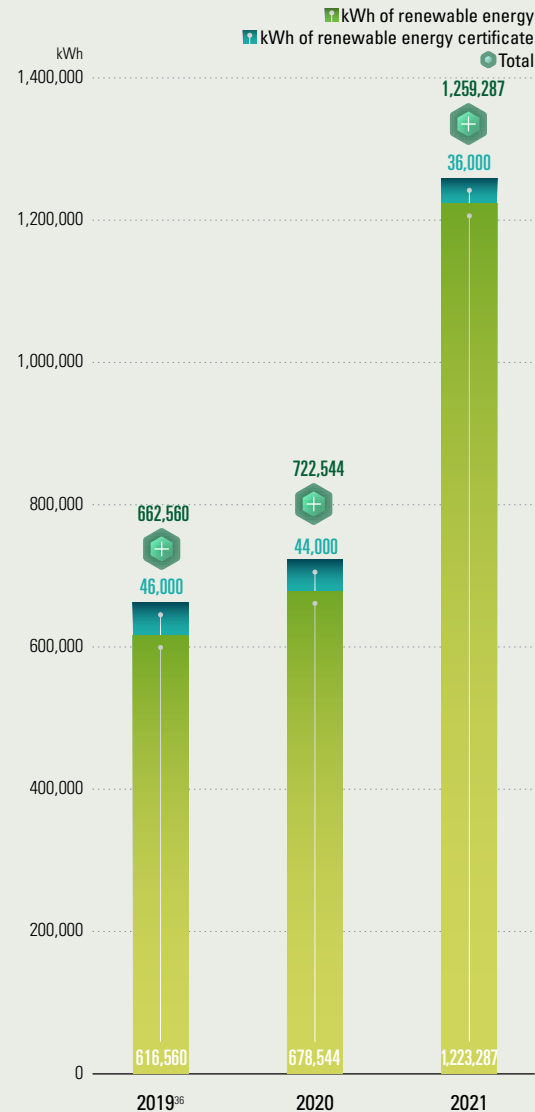
The solar photovoltaics system that NKUST has installed can be classified into the following four kinds, and it generated about 1,259,287 kWh of electricity in 2021:



✓ Renewable energy facilities, electricity generated with renewable energy, the number of renewable energy certificates in 2021

Renewable Energy Facility	Electricity Generated with Renewable Energy	Renewable Energy Certificate
The self-built solar photovoltaics system was sold to Taiwan Power Company (Yanchao Campus): With power generation capacity of 499.2 kW	638,352	0
The solar photovoltaics system on the roof top was rented to other companies (The roof top of the College of Electrical Engineering and Computer Science Building, the roof top No.1 and roof top No.2 at Implementation Factory on the First Campus): With power generation capacity of 447.47 kW	584,935	0
Self-power generation and self-consumption for certificates (such as the roof PV system and ground-mounted PV system by the swimming pool on the First Campus): With power generation capacity of 40.2 kW	0	36,000
Joint Rent Tender Project on Public Roofs of Central Authorities in Kaohsiung City (With power generation capacity of 2,979.76 kW)	3,724,700 (Completed in December 2022, so it is not included.)	0
Total	1,259,287	

✓ Renewable energy consumption over the past 3 years



For energy safety, green economy and sustainable environment, NKUST continues to comply with policies and promotional projects of Executive Yuan. Between 2021 and 2022, Bureau of Energy, the Ministry of Economic Affairs conducted the “Joint Rent Tender Project on Public Roofs of Central Authorities,” and set up the solar power system on the rooftop of buildings on each campus with the potential of solar power. It was estimated to generate about 3,035.2 kW of electricity in the hope that the space of the land and buildings could be efficiently planned and used. Additionally, the “renovation construction for Yizhi Building Dormitory on Jiangong Campus” completed in 2022 was in line with the “Self-government Ordinances for Green Buildings in Kaohsiung City,” and 3.72 kW of the solar photovoltaics system was installed at the rooftop for self electricity consumption.



The solar photovoltaic system set up at NKUST is used in the three methods of being sold to Taiwan Power Company, leasing spare roof space for rents, and self electricity consumption. In 2021, about **1,259,287** kWh of electricity was generated.

36. The rented roofs were not counted as the kWh of renewable energy in 2019 and 2020.

5.4 Air Quality and Environmental Monitoring

Regular Indoor Air Quality Tests

In line with the Indoor Air Quality Act, NKUST has formulated indoor air quality management plans for each campus, set up dedicated management personnel and regularly implement indoor air quality testing and measurement. Libraries have been requested to implement the indoor air quality plan. In general, windows in the libraries should be left open, or their ventilation systems are fortified to reduce the concentration of pollutant in the air. Additionally, libraries conduct air quality self-examination every six months, and regular air quality testing every two years.

In 2021, in accordance with the Indoor Air Quality Act, NKUST conducted regular indoor air quality testing every two years for Nanzih Campus, Cijin Campus and Yanchao Campus with test results in compliance with relevant regulations. Relevant information can be found on the website of NKUST's [Environmental, Occupational Safety and Health Center](#) (Classification—Indoor Air Quality Testing). Testing items and testing methods are as follows:

☑ Indoor air quality testing items and testing methods

Item	Testing Method
Carbon dioxide (CO ₂)	Infrared Method (NIEA A448.11C)
Particulate matters under 10 micrometers (PM10)	Beta Ray Attenuation Method (NIEA A206.11C)
Formaldehyde	High Performance Liquid Chromatography (HPLC) of DNPH Derivative (NIEA A705.12C)
Germs	Concentration of Germs in the Air Testing Method (NIEA E301.15C)



▲ Regular indoor air quality testing (CO₂, PM10; formaldehyde) carried out in the Current Journals Area on the second floor of Library and Information Building on First Campus



▲ Regular indoor air quality testing (germs) carried out in the Western Books Reading Area on the third floor of Library and Information Building on First Campus

Overview of Campus Environmental Monitoring

NKUST implements environmental monitoring on the First Campus and Yanchao Campus in accordance with the commitment to the environmental impact assessment every quarter, with items covering air quality, noise, vibration, traffic flow and surface water to ensure the development plan's degree of negative impact on the surrounding areas during the period of operation and construction. The consistent monitoring system helps inspect and evaluate items that might have negative impact on the environment to achieve the following objectives:

- ◆ Building the background information of environmental quality to judge the long-term trends in the change of environmental quality.
- ◆ Evaluating the possibility of mitigating or avoiding adverse effects on the execution outcomes, and proposing amendments or remedies based on them.
- ◆ Timely revising construction plans or operational guidelines based on monitoring results to lower impact on the environment.

Please refer to the Campus Environmental Monitoring section on the [website of Environmental, Occupational Safety and Health Center of NKUST](#) for a detailed report.



Occupational Safety and Health Center



website of Environmental, Occupational
Safety and Health Center of NKUST



5.5 Waste

General Waste

Maintaining the cleanliness and hygiene of the campus can provide a good environment for learning and research for faculty and students. NKUST follows the “Waste Disposal Act” and “Resource Recycling Act” of the Environmental Protection Administration, Executive Yuan to promote waste reduction, recycling and the correct concepts and habits for reuse to effectively remove and dispose of waste and lower the burden on the environment. Legal contractors are hired every year to collect, load, remove, transport and process campus waste. In response to the increasing waste disposal costs in recent years, NKUST plans to add recycling bins and campaigns on campus to move towards the goals of further waste reduction and resource recycling.

By executing 3R (Reduce, Reuse and Recycle), NKUST regularly announces and campaigns waste reduction and resource recycling. Additionally, recycling bins are added on campus for faculty and students to recycle, making the sustainable reuse of resources. In 2021, the total amount of waste of NKUST was 1,083.93 metric tons. Among which, the removal and transport

amount was approximately 946.93 metric tons (excluding Jiangong Campus), and the amount of recyclables was approximately 137 metric tons (excluding Cijin Campus). NKUST hopes to gradually move towards a sustainable green campus by recycling resources.

Construction Waste

General waste from building, dismantling, decorating and repairing architectures, general industrial waste and hazardous industrial waste are disposed of or reused by qualified contractors in accordance with the Waste Disposal Act. Upon temporary storage and piling, mud, soil, sand, rocks, bricks, tiles and concrete chunks which are left from building construction and public construction and can be recycled, classified, processed, transported, processed, and reused are useful soil and sand resources, and are treated as constructional surplus soil in accordance with the “Management Program of Constructional Surplus Soil” of the Ministry of the Interior. In 2021, NKUST produced 43.63 metric tons of construction waste which was transported legally to a disposal place for reuse.

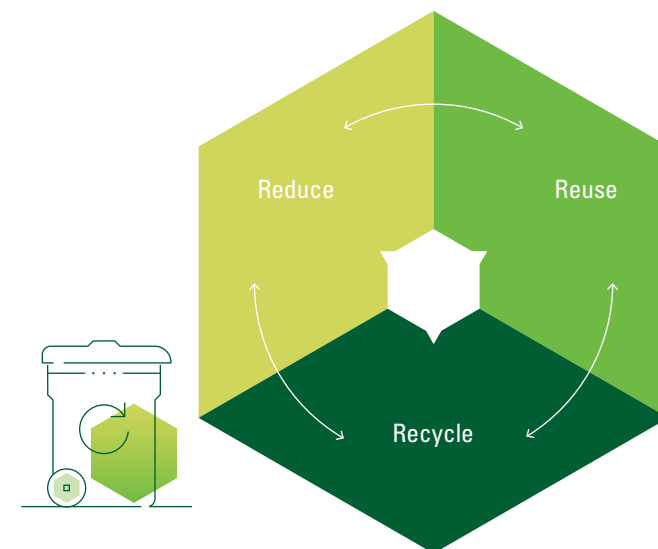
Experimental Waste

To enable faculty and students to understand the classification standards, as well as the storage, removal and disposal specifications of experimental waste, NKUST formulated the “Key Points for the Storage and Disposal of Waste from University Laboratories.” Experimental waste is classified into waste liquid, chemical waste and containers, and infectious waste. Experimental waste is disposed of by qualified contractors. Additionally, the weight of the waste is declared on the Industrial Waste Declaration and Management System of Environmental Protection Administration, Executive Yuan.

In 2021, the experimental waste of NKUST could be classified into hazardous industrial waste and general industrial waste, and the amount of the former was 8.512 metric tons, and that of the latter was 2.105 metric tons. Qualified contractors were commissioned to dispose of the waste. Disposal methods included plasma melting and reuse (intermediate disposal for 8.281 metric tons of hazardous industrial waste, and 0.065 metric tons of general industrial waste), and landfill (final disposal for 0.231 metric tons of hazardous industrial waste, and 2.04 metric tons of general industrial waste).

Amount of waste and disposal methods in 2021

Type of Waste	Total Amount (Metric Tons)	Disposal Method	Disposal Amount (Metric Tons)
General waste	1,083.93	Incineration	946.93
		Recycle and reuse	137
Construction waste	43.63	Recycle and reuse	43.63
Experimental waste	8.512	Plasma melting and reuse	8.281
		Landfill	0.231
	2.105	Plasma melting and reuse	0.065
		Landfill	2.04



5.6 Water Resources

Based on the total water consumption of 664,316 m³ in 2019, the total water consumption of NKUST was 585,838 m³ in 2021, reducing by 78,478 m³ (by 11.81%). However, NKUST still needs to track and observe to see if the range of reduction was because of the pandemic prevention measures or online instruction due to the impact of the COVID-19 pandemic.

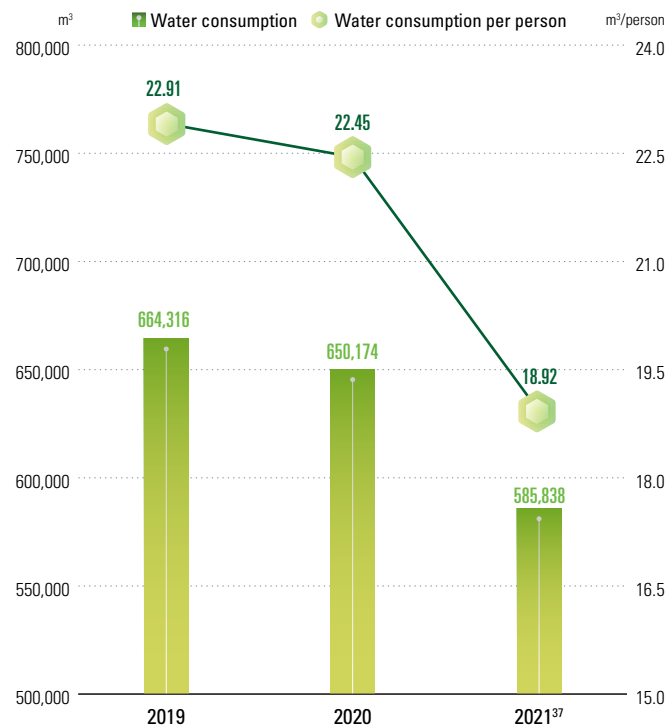
Sewage treatment plants have been set up on the First Campus and Yanchao Campus at NKUST. The other campuses have been

incorporated in the underground sewer systems. The brief introduction and recycling amount of these two sewage treatment plants are as follows.

The sewage treatment plant on the East Campus of the First Campus at NKUST mainly disposes of domestic sewage from academic buildings, and sewage from cleaning experimental equipment in the laboratories. The amount of sewage is about 227CMD every day. Additionally, the sewage treatment plant on

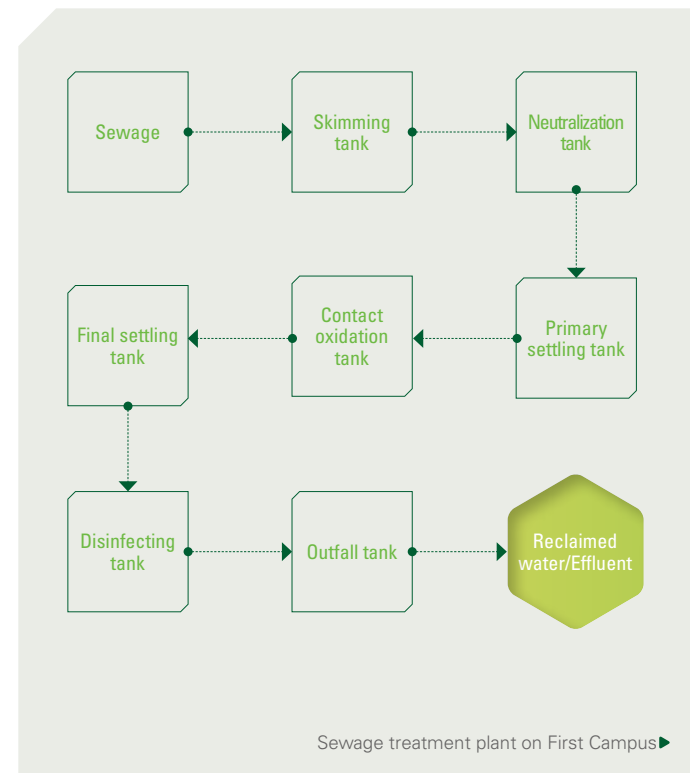
the First Campus has been equipped with water recycling facilities to recycle and reuse sewage from the sewage treatment plant. Approximately 5CMD of recycled water is used for irrigation, and the rest is released. Moreover, the sewage treatment facility in the basement floors of Jingye Building on the West Campus chiefly disposes of domestic sewage from student dormitories. The amount of sewage is about 50CMD, and after it is treated, it is released to the ecological pond for reuse.

Water consumption and intensity over the past 3 years



37. The water consumption per person in 2021 was counted based on the total number of 30,967 people on campus.

Sewage treatment procedure on campuses

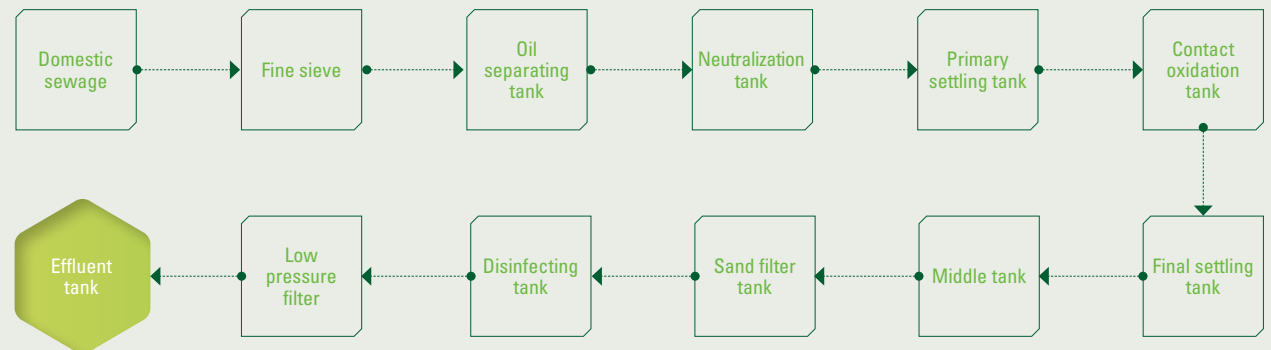


Sewage treatment plant on First Campus ▶



The sewage treatment plant on Yanchao Campus of NKUST chiefly disposes of domestic sewage from academic buildings and dormitories. The amount of sewage is about 100CMD every day. After sewage is treated, it is released to the tributary of Dianbao River, which effectively reduces negative impact on local water resources.

☑ Sewage treatment procedure on Yanchao Campus



▲ Sewage treatment plant on Yanchao Campus



5.7 Campus Ecology

As you stroll on the lush campus, you will witness vitality in every corner. NKUST has always respected ecology since its founding, and the environment has been carefully created by ecological construction methods and green plants. The campus today attract countless insects and birds. Nearly 200 plant species, 45 insect species, and 50 bird species have been spotted during more than half a year of field study, serving as the best witnesses for a green campus.

The most representative feature of campus ecology is the Plover Pond (Ecological Pond) located on the First Campus.

As you enter the campus from the west gate, you will see a vast and clean pond. The Plover Pond covers an area of approximately 14,000 square meters. It was originally constructed as a flood control measure. In addition to flood storage, it helps with water resource utilization and ecological protection. Today, the ecological pond has formed a complete ecological chain with many wild bird visitors. Egrets and other bird species have been spotted.

Yanchao Campus is located in Yanchao District, Kaohsiung City with Shenshui River, the tributary of Dianbao River, flowing through

the campus. The campus is quiet and beautiful. The total area of the campus is 109 hectares, but only a little over 10 hectares of the area have been developed. The rest is undeveloped hilly land. The original forest of the campus is well preserved with rich ecological resources. In the future, the campus can serve as an important source of carbon sink for the net zero carbon emission goal at NKUST. The five major campuses of NKUST each their own ecological features. The [Campus Walking Maps](#) can be found on the official website of NKUST. Enjoy a relaxing experience!



▲ Plover Pond on First Campus



▲ Campus Walking Map of Yanchao Campus



The Campus Walking Maps



There are 9 green buildings in NKUST. Among these, Diving Pool and the Internship Building of the Department of Seafood Science on Nanzih Campus, Business Building, the second-phase Building of the College of Management, the College of Humanities and Social Sciences, and Library and Information Building on Yanchao Campus have received the qualified green building marks. The first phase of faculty, staff and student dormitories on Yanchao Campus has passed 5 indicators, receiving the Bronze-level green building mark. The Administration Building on Yanchao Campus, and the Second Building and Southern Taiwan Professional Training and Material Dispatch Center on the First Campus have passed 8 indicators, receiving the Silver-level green building marks.

Green buildings are assessed with nine major indicators, including “biodiversity indicator,” “greening indicator,” “soil water retention indicator,” “daily energy conservation indicator,” “carbon dioxide reduction indicator,” “waste reduction indicator,” “indoor environment indicator,” “water resources indicator,” and “sewage and garbage improvement indicator” in the four major indicator groups of ecology, energy conservation, waste reduction and health. The Second Building at the Industrial and Experimental Park on the First Campus which was recently completed has obtained 8 out of the 9 major indicators, including the indicators of greening, soil water retention, daily energy conservation, carbon dioxide reduction, waste reduction, indoor environment, water resources, and sewage and garbage improvement.



Green buildings

There are **9** green
buildings in NKUST

Yanchao Campus Administration Building  Silver-level	First Campus Second Building  Silver-level	First Campus Southern Taiwan Professional Training and Material Dispatch Center  Silver-level
Yanchao Campus The first phase of faculty, staff and student dormitories  Bronze-level	Nanzih Campus Diving Pool and the Internship Building of the Department of Seafood Science  Received	Yanchao Campus Business Building  Received
Yanchao Campus second-phase Building of the College of Management  Received	Yanchao Campus College of Humanities and Social Sciences  Received	Yanchao Campus Library and Information Building  Received



▲ Library and Information Building



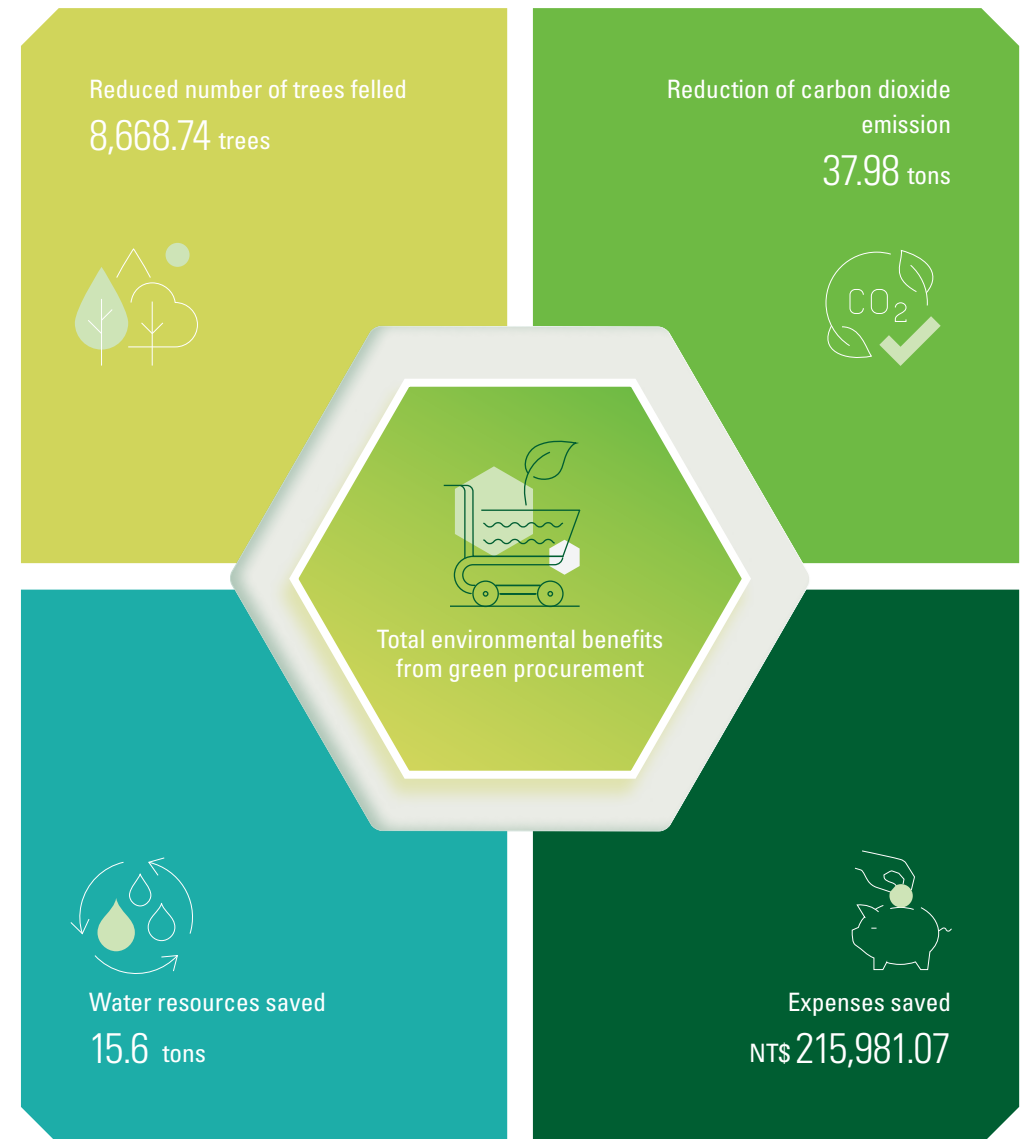
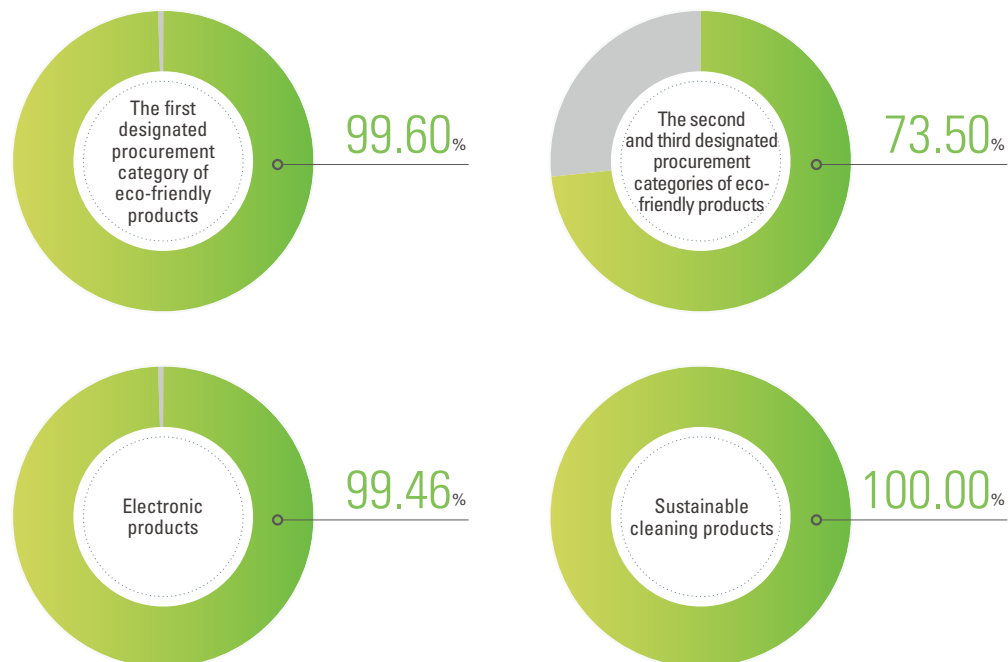
▲ College of Humanities and Social Sciences on Yanchao Campus

NKUST upholds the philosophy of sustainable campus. Therefore, the concept of green buildings was integrated in addition to integral, educational, practical, safe and diversified features when the school buildings were planned. NKUST hopes to provide excellent teaching venues, promote environmental protection and energy conservation, and campaign environmental education to build a sustainable, forward-looking and eco-friendly campus with green buildings.

5.8 Green Procurement

Green procurement aims to reduce the impact on the environment by choosing “recyclable, low pollution and energy saving” green products, as well as encouraging green consumption through rewarding the production and use of green products. NKUST adopts the “Regulations for Priority Procurement of Eco-Products” of Executive Yuan and relevant procurement performance evaluation methods to prioritize eco-friendly products with green labels listed on the Green Living Information Platform of the Environmental Protection Administration to actively promote green procurement practices within the university. In 2021, the percentage of total green procurement items reached 99.60%, while the green procurement of electronic products, sustainable cleaning products and office paper reached 100%.

✓ Ratio of green procurement in 2021



5.9 Food Safety and Health

Sustainable Ingredients and Diet

Food provided at NKUST is outsourced. Although suppliers have to purchase ingredients, they are requested to purchase only vegetables, fruits and meat produced locally in Taiwan. With respect to the reduction of kitchen waste, consumers can ask suppliers to reduce the amount of food served when they make a purchase. Consumers are asked to take only the right amount. Appropriate consumption reduces the amount of kitchen waste, and helps form the good habit of never wasting food.

Additionally, vegetarian or vegan meals are provided by NKUST's buffet suppliers. They help reduce the amount of carbon emission when animals are raised. There are a total of 10 restaurants on the university's campuses, including a Chinese restaurant, food court, dormitory restaurant, restaurant on the 6th floor of the library, and coffee shop at the College of Electrical Engineering and Computer Science on the First Campus, the food court on Nanzih Campus, a restaurant on Yanchao Campus, a restaurant on Cijin Campus, and a restaurant and coffee shop on Jiangong Campus. All buffet suppliers provide vegetarian or vegan meals. However, the 2 coffee shops do not offer vegetarian meals. The percentage of vegetarian restaurants at NKUST is 80%.

Plastic Reduction Policy on Campus

The outsourced management contract of NKUST includes plastic reduction articles. Suppliers are not allowed to use plastic and styrofoam tableware (including cups, bowls, plates, saucers, meal boxes, plastic plates that hold food inside a meal box, and so on). Additionally, no plastic (including styrofoam) disposable tableware should be provided for consumers dining in or taking out. However, chopsticks and spoons for takeout food are not subject to the provisions. If there is any change, NKUST will comply with the government's laws and decrees. When suppliers violate any regulations, they shall be fined between NT\$1,200 and NT\$6,000 in accordance with Article 51 of the Waste Disposal Act, and the fine shall be paid by suppliers.

Food Safety Management

To enhance the quality of food provided at the university cafeterias and maintain a safe food environment on campus, NKUST actively implements a food safety management system based on four main management policies through the division of responsibilities among the Office of Student Affairs, Office of General Administration, and Office of General Affairs. Effective food safety management can be achieved with the self-management mechanism and food safety testing, providing food safety for faculty and students. The nutritionists at the Health Division of the Office of Student Affairs serve as food hygiene supervisors. They conduct supervision in cafeterias during their opening hours, and ask suppliers to have their cafeterias checked in accordance with the regulations. Supervisors shall check the cafeterias at least once a week, and the suppliers are required to make improvements for any flaws within a time limit, with relevant records archived for reference. Additionally, in response to the campus food registration system promoted continuously by the Ministry of Education, suppliers of NKUST shall

log on to the campus food registration platform during their opening hours to provide information on campus food in accordance with the articles on their lease agreement.

Water Quality Inspection

Drinking fountains are available on the NKUST campuses for the faculty, students and the general public. To prevent water-borne diseases, NKUST follows the "Regulations of Use and Maintenance of Continuous Drinking Water Supply Fixed Equipment" to commission external companies to check drinking foundations and ensure drinking water safety every quarter. Maintenance companies are asked to maintain and improve drinking fountains with excess *Escherichia coli*. Relevant water quality inspection information can be found on the website of NKUST's Environmental, Occupational Safety and Health Center (Classification—Drinking Water Inspection). The water quality inspection reports all conform to the regulations.



Appendix

Sustainability Performance

Sustainability Courses



Measure	Unit	2020	2021	Corresponding Chapter(s)/Section(s)
Sustainability Courses	Courses	357	1,077	4.1 Sustainability Courses
Departments offering at least one sustainability course	Departments	39	58	4.1 Sustainability Courses
Departments ³⁸ offering at least one sustainability course as a proportion of all departments	Percentage	78%	90.6%	4.1 Sustainability Courses
Departments making sustainability courses mandatory	Departments	21	34	4.1 Sustainability Courses
Departments making sustainability courses mandatory as a proportion of all departments	Percentage	42%	53.1%	4.1 Sustainability Courses

Sustainability Research



Measure	Unit	2020	2021	Corresponding Chapter(s)/Section(s)
Sustainability research papers	Papers	72	162	3.1 Sustainability Research Projects and Papers
Sustainability research projects	Projects	96	194	3.1 Sustainability Research Projects and Papers
Researchers engaging in sustainability research projects/papers	Persons	91	222	3.1 Sustainability Research Projects and Papers
Departments recruiting at least one sustainability researcher	Departments	35	56	3.1 Sustainability Research Projects and Papers
Departments recruiting at least one sustainability researcher as a proportion of all departments	Percentage	70%	87.5%	3.1 Sustainability Research Projects and Papers
Research papers on Open Access Journals	Papers	286	429	3.1 Sustainability Research Projects and Papers
Research papers on Open Access Journals as a proportion of all research papers	Percentage	42%	50.8%	3.1 Sustainability Research Projects and Papers

38. "Departments" includes a total of 64 independent graduate institutes, PhD programs, in-service programs, and degree programs.

Smart Green Campus



Measure	Unit	2020	2021	Corresponding Chapter(s)/Section(s)
Electricity consumption	kWh	41,855,246	39,537,328	5.2 Greenhouse Gas and Energy
Energy Unit Index (EUI)	kWh/square meter	69.82	67.4	5.2 Greenhouse Gas and Energy
Greenhouse gas emissions (Scope I)	CO ₂ e, metric tons	105	100	5.2 Greenhouse Gas and Energy
Greenhouse gas emissions (Scope II)	CO ₂ e, metric tons	20,710	20,125	5.2 Greenhouse Gas and Energy
Electricity generated via renewable energy (including Feed-In Tariff (FIT) and Renewable Energy Certificates)	kWh	722,544	1,259,287	5.3 Solar Power
Amount of waste (including general waste, recyclables, industrial waste, and construction waste)	Metric tons	3,965	1,139	5.5 Waste
Water consumption	KL of water	650,174	585,838	5.6 Water Resources
Water consumption per person	KL of water/person	22.45	18.92	5.6 Water Resources
Proportion of products that are Category I Eco-Products Designated for Purchase	Percentage	99.59%	99.6%	5.8 Green Procurement
Valid Green Building Label certificates (including candidate certificates)	Number of certificates	3	3	5.7 Campus Ecology
People taking public transportation	Persons	163,555	113,970	5.2 Greenhouse Gas and Energy
Courtesy bicycles applied for	Number of applications	495	478	5.2 Greenhouse Gas and Energy

Diversity and Well-being



Measure	Unit	2020	2021	Corresponding Chapter(s)/Section(s)
Proportions for personnel participation in University Affairs Meetings				
Academic staff	Percentage	83%	82%	1.4 Diversified Governance
Non-academic Staff	Percentage	7%	7%	1.4 Diversified Governance
Student representatives	Percentage	11%	11%	1.4 Diversified Governance
Gender ratio of participants in University Affairs Meetings (male: female)	Proportion	4.31	4.23	1.4 Diversified Governance
Student gender ratio (male: female)	Proportion	1.78	1.77	1.4 Diversified Governance
Full- and part-time faculty gender ratio (male: female)	Proportion	2.37	2.38	1.4 Diversified Governance

Diversity and Well-being



Measure	Unit	2020	2021	Corresponding Chapter(s)/Section(s)
Financially disadvantaged students				
Incentives awarded	Amount (NT\$)	14,386,887	20,448,545	2.1.1 Enrollment and Measures for Disadvantaged Students
Persons receiving incentives	Persons	2,133	2,303	2.1.1 Enrollment and Measures for Disadvantaged Students
Tuition and fees reduction				
Total applied for	Amount (NT\$)	82,232,884	81,906,048	2.1.1 Enrollment and Measures for Disadvantaged Students
Number of applicants	Persons	4,833	4,824	2.1.1 Enrollment and Measures for Disadvantaged Students
Student loans				
Total applied for	Amount (NT\$)	267,478,137	271,298,777	2.1.1 Enrollment and Measures for Disadvantaged Students
Number of applicants	Persons	9,095	9,163	2.1.1 Enrollment and Measures for Disadvantaged Students
Scholarships and financial aids				
Total applied for	Amount (NT\$)	41,457,563	41,502,886	2.1.1 Enrollment and Measures for Disadvantaged Students
Number of applicants	Persons	2,879	3,200	2.1.1 Enrollment and Measures for Disadvantaged Students
Cases of recorded faculty and staff disabling injuries and occupational diseases	Incidents	4	2	2.1.8 Occupational Safety and Health

Campus Sustainability and Social Participation



Measure	Unit	2020	2021	Corresponding Chapter(s)/Section(s)
University social responsibility (USR) projects	Projects	5	5	3.3 University Social Responsibility (USR) Projects
Governmental sustainability projects undertaken by faculty and staff	Projects	11	71	3.5 Sustainability Projects with Government Agencies
Student sustainability clubs	Clubs	19	13	2.2.2 Sustainability Student Club
People being served by student service learning and rural service teams	Persons	93	569	2.2.3 Service Learning and Rural Service
Number of continuing education courses related to sustainability	Courses	43	59	2.4.3 Education Promotion and Brand Products

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Summary of Assured Subject Matter Information

No.	Assured Subject Matter Information	Reporting Criteria	Page
1	Number of journal publications in 2021	The number of journal publications included the number of SCI, SSCI, and A&HCI papers (articles and review articles) published by NKUST in 2021 and compiled as of December 20, 2022 (PwC Taiwan's date of assurance) in the Web of Science (WOS) database. Note: The WOS database's content and search algorithms may be dynamically adjusted at any time, and this may lead to different search results. Thus, the data search end date is the PwC Taiwan date of assurance.	P. 51
2	2021 proportion of Category I Eco-Products Designated for Purchase	Based on amounts and ratios of green procurement for 2021 shown via NKUST procurement staff system permissions, when logged in to the Executive Yuan's Environmental Protection Administration Green Living Information Platform. Note: In accordance with the Government Procurement Act and the Regulations for Priority Procurement of Eco-Products, the proportion of Category I Eco-Products Designated for Purchase shall conform to the regulations in the Environmental Protection Administration's Agency Green Procurement Performance Evaluation Method.	P. 92
3	Renewable energy usage in 2021	NKUST has installed solar photovoltaic systems to generate and sell electricity to the Taiwan Power Company and other enterprises. Payments fall into three categories: 1. NKUST has signed feed in tariff (FIT) contracts with Taiwan Power Company and other public utility providers for renewable electricity generation facilities installed by NKUST. The University receives a FIT electricity bill from Taiwan Power Company every month; adding all months' electricity generation produces the total electricity generated for the year. 2. University building rooftops are rented to solar panel company(ies) for installation of solar photovoltaic systems. Electricity generated from the systems is then sold to Taiwan Power Company, from which NKUST receives a fee. The University receives a FIT electricity bill from Taiwan Power Company every month; adding all months' electricity generation produces the total electricity generated for the year. 3. Renewable electricity generation facilities installed by NKUST is registered with a) the Ministry of Economic Affairs' Bureau of Energy, and b) the National Renewable Energy Certificate Center. Equipment power meters are connected to the National Renewable Energy Certificate Center, which automatically records the amount of electricity generated by renewable electricity generation facilities. The Office of General Affairs' Construction and Maintenance Division summarized electricity generated in the aforementioned three categories for the Office of Sustainable Development to compile the Sustainability Report.	P. 85
4	University-level contracts	The number of valid university-level contracts was calculated as of December 20, 2022 (PwC Taiwan's date of assurance) in accordance with statistics compiled by the Office of International Affairs. Note: On December 20, 2022, the information was exported to Excel from the Office of International Affairs' management system, and then valid 2021 university-level contracts were then collated by hand. Some contracts may have been extended, changed, and/or had additions made to them. If a contract was not specified as abolished, it was considered valid within its period of validity. The number of contracts was calculated in accordance with the number of contracts signed.	P. 8
5	Incentives for financially disadvantaged students	In accordance with the incentive mechanism of the Higher Education SPROUT Project organized by the Ministry of Education for financially or culturally disadvantaged students, NKUST's Higher Education SPROUT Project Office compiled the number of persons receiving incentives and incentive amounts awarded into an Incentive Name List, and presented the project results to the Ministry of Education. Note: The information is the Incentive Name List for the second semester of the 2020 academic year, and the first semester of the 2021 academic year. If a student wishes to participate in the Higher Education SPROUT Project, they must apply for a learning passport by filling out a Google form. Afterwards, they may sign up for each incentive program based on their personal status. Only after review and approval by unit supervisory personnel can their application proceed to cancellation, incentive disbursement, or other steps by the chief accounting officer and cashier officer.	P. 23

Independent Limited Assurance Report



Independent Limited Assurance Report

To National Kaohsiung University of Science and Technology

We have been engaged by National Kaohsiung University of Science and Technology ("NKUST") to perform assurance procedures on the sustainability performance information identified by the NKUST and reported in the 2021 Sustainability Report (hereinafter referred to as the "Subject Matter Information"), and have issued a limited assurance report based on the result of our work performed.

Subject Matter Information and Applicable Criteria

The sustainability performance information identified by the NKUST and the respective applicable criteria are stated in the "Summary of Assured Subject Matter Information" on page 102 of the Sustainability Report. The scope of the aforementioned Subject Matter Information is set out in the "Boundary and Scope" on page 2 of the Sustainability Report.

Management's Responsibilities

The Management of the NKUST is responsible for the preparation of the sustainability performance information disclosed in the Sustainability Report in accordance with the respective applicable criteria, and for such internal control as management determines is necessary to enable the preparation of the sustainability performance information that is free from material misstatement, whether due to fraud or error.

Our Responsibilities

We conducted our assurance work on the Subject Matter Information disclosed in the Sustainability Report in accordance with the International Standard on Assurance Engagements 3000, "Assurance Engagements other than Audits or Reviews of Historical Financial Information" issued by the International Auditing and Assurance Standards Board, to identify whether any amendment is required of the Subject Matter Information to be prepared, in all material respects, in accordance with the respective applicable criteria, and issue a limited assurance report.

We conducted our assurance work in accordance with the aforementioned standards including identifying the areas where there may be risks of material misstatement of the Subject Matter Information, and designing and performing procedures to address the identified areas. The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had we performed a reasonable assurance engagement.

The extent of the assurance work we performed were based on the identified risk areas and determined materiality, and given the circumstances of the engagement, we designed and performed the following procedures:

- Made inquiries of the persons responsible for the Subject Matter Information to understand the processes, information systems, and the relevant internal controls relating to the preparation of the aforementioned information to identify the areas where there may be risks of material misstatement; and

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- Based on the above understanding and the areas identified, performed selective testing (including inquiry, observation, inspection, and reperformance) to obtain evidence for limited assurance.

We do not provide any assurance on the Sustainability Report as a whole or on the design or operating effectiveness of the relevant internal controls. Our assurance does not extend to information in respect of earlier periods or to any other information disclosed in the Sustainability Report for 2019.

Compliance of Independence and Quality Control Requirement

We have complied with the independence and other ethical requirements of the International Code of Ethics for Professional Accountants (including International Independence Standards) issued by the International Ethics Standards Board for Accountants (IESBA Code), which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

Our firm applies International Standard on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Inherent Limitations

Certain Subject Matter Information involves non-financial data which is subject to more inherent limitations than financial data. Qualitative interpretations of the relevance, materiality and the accuracy of data are subject to individual assumptions and judgments.

Limited Assurance Conclusion

Based on the procedures we have performed and the evidence we have obtained, we are not aware of any amendment that is required of Subject Matter Information to be prepared, in all material respects, in accordance with the respective applicable criteria."

Other Matter

The Management of the NKUST is responsible for maintaining the NKUST's website. If the Subject Matter Information or the applicable criteria are modified after this limited assurance report is issued, we are not obliged to re-perform the assurance work.

Lin, Tzu-Sha
Independent Accountants
PricewaterhouseCoopers, Taiwan
Republic of China
December 28, 2021

For the convenience of readers and for information purpose only, this document has been translated into English from the original Chinese version. In the event of any discrepancy between the English version and the original Chinese version or any differences in the interpretation of the two versions, the Chinese-language version shall prevail.

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