

# Sustainability Report of College of Engineering

## I. Sustainable Development Vision

According to the Medium-Term Plan for School Development (2021-2025) and the vision of sustainable development in line with the 17 Sustainable Development Goals (SDGs) of United Nations by 2030, we coordinate and implement academic research, university-industry cooperation, education and sustainable goals for the sustainable development of economy, society and environment in and out of Taiwan.

## II. Sustainable Development Goals (SDGs)

College of Engineering

| Index  | 1 NO POVERTY | 2 ZERO HUNGER | 3 GOOD HEALTH AND WELL-BEING | 4 QUALITY EDUCATION | 5 GENDER EQUALITY | 6 CLEAN WATER AND SANITATION | 7 AFFORDABLE AND CLEAN ENERGY | 8 DECENT WORK AND ECONOMIC GROWTH | 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE | 10 REDUCED INEQUALITIES | 11 SUSTAINABLE CITIES AND COMMUNITIES | 12 RESPONSIBLE CONSUMPTION AND PRODUCTION | 13 ACCIÓN POR EL CLIMA | 14 LIFE BELOW WATER | 15 LIFE ON LAND | 16 PEACE AND JUSTICE: STRONG INSTITUTIONS | 17 PARTNERSHIPS FOR THE GOALS |
|--|--------------|---------------|------------------------------|---------------------|-------------------|------------------------------|-------------------------------|-----------------------------------|---|-------------------------|---------------------------------------|---|------------------------|---------------------|-----------------|---|-------------------------------|
| Course and Education                         |              | V             | V                            |                     |                   | V                            | V                             | V                                 | V   |                         |                                       | V   | V                      | V                   | V               |   | V                             |
| Academia and Industry University Cooperation | V            | V             | V                            | V                   |                   | V                            | V                             | V                                 | V   | V                       | V                                     | V   | V                      | V                   | V               | V   | V                             |
| Academic Research                            |              | V             | V                            | V                   |                   | V                            | V                             | V                                 | V   |                         | V                                     | V   | V                      | V                   |                 |   |                               |

Our sustainable development goals pursue the sustainability of economy, society and environment with the concept of university education and social responsibility.

Sustainable Key Goals of **Course and Education** Include : SDG 2(ZERO HUNGER) 、SDG 3(GOOD HEALTH AND WELL-BEING) 、SDG 6(CLEAN WATER AND SANITATION) 、SDG 7(AFFORDABLE AND CLEAN ENERGY) 、SDG 8(DECENT WORK AND ECONOMIC GROWTH) 、SDG 9(INDUSTRY, INNOVATION AND INFRASTRUCTURE) 、SDG 12(RESPONSIBLE CONSUMPTION AND PRODUCTION) 、SDG 13(CLIMATE ACTION) 、SDG 14(LIFE BELOW WATER) 、SDG 15(LIFE ON LAND) 、SDG 17(PARTNERSHIPS FOR THE GOALS). 11 Sustainable Development Goals (SDGs) are listed in total.

Sustainable Key Goals of **Academia and Industry-University Cooperation** Include : SDG 1(NO POVERTY) 、SDG 2(ZERO HUNGER) 、SDG 3(GOOD HEALTH AND WELL-BEING) 、SDG 4(QUALITY EDUCATION) 、SDG 6(CLEAN WATER AND SANITATION) 、SDG 7(AFFORDABLE AND CLEAN ENERGY) 、SDG 8(DECENT WORK AND ECONOMIC GROWTH) 、SDG 9(INDUSTRY, INNOVATION AND INFRASTRUCTURE) 、SDG 10(REduced INEQUALITIES) 、SDG 11(SUSTAINABLE CITIES AND COMMUNITIES) 、SDG 12(RESPONSIBLE CONSUMPTION AND PRODUCTION) 、SDG 13(CLIMATE ACTION) 、SDG 14(LIFE BELOW WATER) 、SDG 15(LIFE ON LAND) 、SDG 16(PEACE, JUSTICE AND STRONG INSTITUTIONS) 、SDG 17(PARTNERSHIPS FOR THE GOALS). 16 Sustainable Development Goals (SDGs) are listed in total.

Sustainable Key Goals of **Academic Research** Include : SDG 2(ZERO HUNGER) 、SDG 3(GOOD HEALTH AND WELL-BEING) 、SDG 4(QUALITY EDUCATION) 、SDG 6(CLEAN WATER AND SANITATION) 、SDG 7(AFFORDABLE AND CLEAN ENERGY) 、SDG 8(DECENT WORK AND ECONOMIC GROWTH) 、SDG 9(INDUSTRY, INNOVATION AND INFRASTRUCTURE) 、SDG 11(SUSTAINABLE CITIES AND COMMUNITIES) 、SDG 12(RESPONSIBLE CONSUMPTION AND PRODUCTION) 、SDG 13(CLIMATE ACTION) 、SDG 14(LIFE BELOW WATER). 11 Sustainable Development Goals (SDGs) are listed in total.

Moreover, following the “Five-aspects Strategy” of YunTech (namely as **Characterization, Academization, Industry-University Cooperation, Internationalization and Intellectualization**), we fulfill the university social responsibility (USR) and the spirit of sustainability in acquiring an internationally-recognized university featured by innovative education and industrial integration in line with international standards.

**I. Short-term Target:** Achieve the annual performance target of school affairs.

**II. Medium-term Target:** Gradually realize the vision of sustainability based on YunTech’s Five-ization Strategy through the academization, industry-university cooperation, internationalization, intellectualization and characterization.

**(1)Characterization and Student Enrollment:** Strengthen our connection with feeder schools by digital learning platforms, and carry out course reform and adjustment for better enrollment performance, so as to integrate intelligent education services and improve educational reputation.

**(2)Academicization:** Satisfy “basic requirements” and “special demands” by resource allocation to improve academic research results.

**(3)Industry-University Cooperation:** Negotiate with each department on relevant rights and obligations when each college is responsible for integration or interdisciplinary cooperation. Case-sharing meetings for industry-university cooperation could be carried out and be put into courses to improve industry-university performance.

**(4)Internationalization:** Provide trainings of international enrollment, purchase more precision equipment for PhD program, encourage teachers to participate in or host joint forums, match the International Office with foreign sister schools, and set up the International Student Special Program to attract more students.

**(5)Intellectualization:** The information demand questionnaire shall be filled out by each department for the integration of academic resources (data-sharing) for all faculties and students.

**III. Long-term Target:** In accordance with the 2030 Agenda for Sustainable Development of United Nations and the “Five-aspects Strategy”, a college-focused university will be created. Conforming to all-round demands in academic research, university-industry cooperation, sustainable courses and education of society, environment and students, we will continue our efforts in global sustainable development.

**List plans of sustainability education, academic research and industry-university cooperation in 2020 years.**

★Total number of courses related sustainability and social practice = 57

| 符合 SDGs | Courses | 課名(中英文)  |
|---------|---------|--|
| SDG 2   | 2       | 分析化學(Analytical Chemistry)、生物科技概論(Introduction to Biotechnology)   |
| SDG 3   | 3       | 資訊科技於運動與健康促進之應用(IT Applications in Exercises and Health Promotion)、資訊科技於醫療長期照護之跨領域應用(Information Technology in Long-term Care of The Interdisciplinary Medical Applications)   |
| SDG 6   | 9       | 水資源再生處理技術(The Reclamation and Treatment Technology of Water Resources)、水質分析(water analysis)、地下水文學(Groundwater Hydrology)、地下水污染防治(Groundwater pollution)、污水工程(Wastewater Engineering)、物化處理(Physic chemical treatment processes)、環安衛概論與倫理(Introduction to Environment and Safety & Hygiene and Ethics in Engineering)、環境工程單元操作實驗(Unit operations in Environmental Engineering Lab) |
| SDG 7   | 8       | 生態倫理與綠色意識(Ecological Ethics and Green Ideology)、嵌入式系統導論(Introduction to Embedded System)、節能省電之技術與管理(Technology and Management of Energy & Electricity Saving)、電池製作技術與發展(Battery  |

| 符合 SDGs | Courses | 課名(中英文)   |
|---------|---------|---|
|         |         | Production Technology and Development)、綠色材料概論(Introduction of Green Materials)、綠能產業與元件技術(Green Energy Industries and Device Technology)、環境科學(Environmental Science)、薄膜材料製程技術(Manufacture Technology of Thin Film Material)  |
| SDG 8   | 4       | 工程經濟學(Engineering Economics)、計量經濟學(Econometrics)、鋼筋混凝土設計實習(Reinforce Concrete Structural Laboratory)  |
| SDG 9   | 11      | 工業安全(Industrial Safety)、工業安全實驗(Industrial Process Safety Experiment)、工業安全管理(Industrial Safety Management)、工業毒理學(Industrial Toxicology)、工業配電(Industrial Power Distribution)、工業與環境毒物學(Industrial & Environmental Toxicology)、工業衛生(Industrial Hygiene)、石油化學工業(Petrochemical Industry)  |
| SDG 12  | 1       | 智慧工業技術與應用(Application of Smart Industrial Control Technology)   |
| SDG 13  | 21      | 土木防災專題(Special Topics of Disaster Prevention on Civil Engineering)、分析化學(Analytical Chemistry)、生物處理(Biological Process)、空氣污染物採樣分析(Air Pollutants Sampling and Analysis)、空氣污染控制理論(Theory of Air Pollution Control)、空氣污染控制設備設計(Air Pollution Control and Design)、空氣污染概論(Introduction to air pollution)、氣膠學(Aerosol Science and technology)、實務專題(一)(Senior Design ( I ))、綠能產業與元件技術(Green Energy Industries and Device Technology)、熱力學(Thermodynamics)、機械工程實驗(二)(Mechanical Engineering Lab. ( II ))、環安衛概論與倫理(Introduction to Environment and Safety & Hygiene and Ethics in Engineering)、環境工程(Environmental Engineering)、環境工程單元操作實驗(Unit operations in Environmental Engineering Lab) |
| SDG 14  | 2       | 生態倫理與綠色意識(Ecological Ethics and Green Ideology)、綠建築生態工法(Green Building & Ecological Engineering Methods)  |
| SDG 15  | 2       | 生態倫理與綠色意識(Ecological Ethics and Green Ideology)、綠建築生態工法(Green Building & Ecological Engineering Methods)  |
| SDG 17  | 2       | 國際標準與認證制度(International standards and Certification Institution)、營建國際市場分析(International Engineering Marketing)  |

## Sustainability Related Industry-University Cooperation

★2020 Total Number of Project= 78

| 符合<br>SDGs | Project | 代表性計畫   |
|------------|---------|---|
| SDG 1      | 2       | 大專校院弱勢學生助學計畫學生校外住宿租金補貼、雲林縣地方環境保護計畫編製案。  |
| SDG 2      | 3       | 高光譜智慧新農業之花生瑕疵篩選技術、農業尚愛水(i-Water)，智慧管理田水、應用高光譜影像辨識技術發展智慧新農業以提升農產品質管理為例。                        |
| SDG 3      | 11      | 衛生福利部金門醫院負壓隔離病房檢測服務計畫、員林基督教醫院正負壓病房檢測委託服務、鹿港基督教醫院負壓隔離病房檢測委託服務...等。                             |
| SDG 4      | 13      | 教育優先區中小學生寒假營隊活動、教育優先區中小學生暑假營隊活動、產學攜手合作計畫弱勢學生助學金...等。  |
| SDG 6      | 13      | 水源保育社區推動計畫(中部地區)、南投縣土壤及地下水監測研究工作計畫、高雄市畜牧廢水氨氮回收推動計畫  |
| SDG 7      | 12      | 「雲林離岸風力發電廠興建計畫」工安教育訓練課程、AI 太陽能模組缺陷自動檢測技術、太陽能光電系統建置輔導及推廣                                       |
| SDG 8      | 11      | 教育部補助大專校院安全衛生教育訓練計畫-校園實驗場所安全衛生教育訓練、潔能系統整合與應用人才培育-雲嘉南區域推動中心計畫、毒性及危害性化學品災害聯防組織教育訓練計畫...等。       |
| SDG 9      | 10      | 工業控制系統無線遠端監控技術之實現、水自動滅火系統對建築物區劃內火災能見度改善性能評估研究、以 3D 視覺及深度學習做大型工業物件的自動辨識及取放...等。                |
| SDG 10     | 1       | 產學攜手合作計畫弱勢學生助學金。  |
| SDG 11     | 48      | 「輔導農田水利會推動農業水域太陽光電及小(微)水利發電發展計畫」勞務採購案、永續智慧社區創新實證示範計畫場域建置工程委託設計監造委託技術服務、南投縣土壤及地下水監測研究工作計畫...等。 |
| SDG 12     | 2       | 產業學院計畫-綠色能源科技與民生化工材料、環境教育補助計畫:綠色創新教育計畫—環保領航員，『蚓』水思源、綠色塑膠開發評估...等。                             |
| SDG 13     | 10      | 新竹縣空氣品質綜合管理計畫-新竹縣臭氧污染之空氣品質模式模擬作業、乙級空污防制專責人員訓練班 78 小時、以 CMAQ 模式模擬 2013 年各類排放源對臺灣空氣品質之影響...等。   |
| SDG 14     | 4       | 海洋污染事件緊急應變模擬監測計畫、工廠排氣與循環水管流發電技術研發與人才培育、以生物電化學系統進行廢水無害化與資源化之程序技術開發...等。                        |
| SDG 15     | 4       | 水源保育社區整合管理推動計畫、桶頭攔河堰下游河段水文環境監測及湖山水庫營運地下水保育效益評析、運用高光譜遙測技術與深度學習發展智慧森林環境監控...等。                  |

| 符合<br>SDGs | Project | 代表性計畫                                     |
|------------|---------|---|
| SDG 16     | 1       | 產學攜手合作計畫弱勢學生助學金。                          |
| SDG 17     | 2       | 協助東鰲工業火警災後重建產學合作計畫、經濟部工業局產業人才能力鑑定產學合作推廣案。 |

### Sustainability Related Academic Research

★2020 Total Number of Research =87

| 符合<br>SDGs | Research | 代表學術發表  |
|------------|----------|---|
| SDG 2      | 1        | A hybrid CFS filter and RF-RFE wrapper-based feature extraction for enhanced agricultural crop yield prediction modeling.   |
| SDG 3      | 10       | Cloud Computing-Based Analyses to Predict Vehicle Driving Shockwave for Active Safe Driving in Intelligent Transportation System.; Design, synthesis of tri-substituted pyrazole derivatives as promising antimicrobial agents and investigation of structure activity relationships.; Impact Fracture of Polymer-Filled Braided Composite Tubes.   |
| SDG 4      | 2        | A comparison of a virtual lab and a microcomputer-based lab for scientific modelling by college students.; Cognitive learning performance assessment and analysis with CSCL applied on the NetGuru platform and CSPL applied on the TAoD platform for the network experiment class.   |
| SDG 6      | 11       | A structural equation model of success in drinking water source protection programs.; Characterization of basin-scale aquifer heterogeneity using transient hydraulic tomography with aquifer responses induced by groundwater exploitation reduction.; Enhancement of power generation with concomitant removal of toluene from artificial groundwater using a mini microbial fuel cell with a packed-composite anode. |
| SDG 7      | 45       | A network sensor fusion approach for a behaviour-based smart energy environment for co-making spaces.; Al-Doped ZnO Transparent Conducting Glass with an IGZO Buffer Layer for Dye-Sensitized Solar Cells.; Analysis and implementation of a phase-shift pulse-width modulation converter with auxiliary winding turns.   |
| SDG 8      | 3        | Characteristic analysis of occupational confined space accidents in Taiwan and its prevention strategy.; Construction safety success factors: A Taiwanese case study.; Recent situation and progress in biorefining process of lignocellulosic biomass: Toward green economy.   |

| 符合<br>SDGs | Research | 代表學術發表   |
|------------|----------|--|
| SDG 9      | 9        | A dual-gas sensor for simultaneous detection of methane and acetylene based on time-sharing scanning assisted wavelength modulation spectroscopy.; Building a care management and guidance security system for assisting patients with cognitive impairment.; Development and Characterization of Nano-emulsions Based on Oil Extracted from Black Soldier Fly Larvae. |
| SDG 11     | 9        | A novel environmental monitoring strategy for industrial safety and disaster prevention management applications.; Analysis of a three-level bidirectional ZVS resonant converter.; Applications of dust explosion hazard and disaster prevention technology.   |
| SDG 12     | 4        | A novel environmental monitoring strategy for industrial safety and disaster prevention management applications.; Thermogravimetric evaluation of the effect of LiBF <sub>4</sub> ; An Improved Recycling Folded-Cascode Amplifier with High Unity-Gain Frequency.   |
| SDG 13     | 5        | Damage effects on coal mechanical properties and micro-scale structures during liquid CO <sub>2</sub> ; Experimental study of the effects of gas adsorption on the mechanical properties of coal.; Inhibiting effects of gas–particle mixtures containing CO.  |
| SDG 14     | 1        | Impregnation of magnetic - Momordica charantia leaf powder into chitosan for the removal of U(VI) from aqueous and polluted wastewater.  |