# College of Engineering

The College of Engineering of Yuan Ze University (YZU) is devoted to educating and preparing graduates for leadership in industry, government, and educational institutions; advancing the knowledge base of the engineering professions; and influencing the future direction of engineering education and practice.

## Department of Mechanical Engineering

### Curriculum

Freshmen: Focus on the cultivation of basic knowledge; stimulation of creative thinking and enthusiasm for mechanical engineering via hands-on practice.

Sophomores: In continuation of basic learning, sophomores are given advanced professional lessons, so they are able to further integrate their mechanical know-how applications, demonstrating their capabilities in resolving engineering problems using such mechanical know-how, thereby understanding future trends in mechanical

engineering.

Juniors and Seniors: With the aid of instructors from the industry, the curriculum is designed to provide students with practical industrial experience via internships, or gain insights the problems encountered by the industry via projects. For students who plan to pursue further studies, the curriculum is to strengthen the cultivation of professional knowledge and foundation for advanced studies.

### Research Subject

#### Development of New Energy and Power Saving Technologies

1. Developments of Application of Fuel Cell Electrical Vehicles
2. Key Technologies and Systems of Fuel Cell Drones
3. Aging,Testing and Analyses of Proton Exchange Membrane Fuel Cell
4. Electrolysis of High-temperature Solid Oxide and Power Generation Technology
5. Generation and Storage of Hydrogen and its Medical Applications

#### Dynamics and Reliability Analysis of Mechanical and Electronic Systems

1. Measurement of Rotary Machine Vibration and Failure Diagnosis and Analysis
2. Muffler Design and Noise Prevention
3. Reliability Tests and Mechanics Analyses of Electronic System and Devices
4. Metal Punch Forming and Tribology Analysis
5. Structural Fatigue and Damage Mechanisms and,Ultrasonic Inspection Technology

#### Nano/Micro-Materials and Applications

1. Nano/Micro Sensor Development
2. Mechanical and Thermal Analysis of Nano Composites
3. Fatigue and Damage Analysis of Nanocomposite
4. Application of Carbon nanotubes and Graphene Membranes
5. Synthesis, Modification and Hydrogen Storage CapacityStudy

#### Biomedical Optomechatronics

1. Design and System Development of Physiologic Signal Instruments
2. Development of the Monitoring Network Systems in Operating Rooms and ICUs
3. Development of Vibrating Insoles for Stimulating Walking Balance
4. Development of the Dummy Simulation System for Medical Practice

#### Automatic Control and Industry 4.0

1. Smart Automation and Industrial Robot Control
2. Electronic Control System for Vehicles
3. IoT Smart Sensor System
4. Unmanned Aircraft Control System and Application Techniques

## Department of Chemical Engineering and Materials Science

### History

The department of Chemical Engineering and Materials Science was established in August 1989 as Chemical Engineering Department with undergraduate program. One year later, in August 1990, the department started Master degree program. The department is undertaking an extensive expansion program in faculty, equipment and research commensurate with University’s objective of strengthening and broadening research activity at both graduate and undergraduate levels.

Thus after eight years, i.e. August 1998, the department established PhD program. During the first 15 years, the department focuses on the core area of chemical engineering and also the interdisciplinary areas with materials science, environmental technology, and biotechnology. The faculties of the department strongly cooperate with Environmental Technology Center, Fuel Cell Center, and Research and Development Center of Far Eastern Textile Co in materials, fuel cells and environmental research programs. The department has developed three course programs for students to take, i.e. (1) Chemical and environmental program; (2) Materials program; and (3) Biotechnological program. In August 2004, the department decided to change its title as “Department of Chemical Engineering and Materials Science”.

The department is currently located in 2 to 4 floors of Yuan Ze 2nd building with house research and teaching laboratories and lecture rooms. The Instrumental Center of the department owned modern chemical and materials characterization equipments including: (1) FTIR, UV, and Raman spectroscopy; (2) GC, HPLC, and ICP chromatography; (3) DSC, TGA, and TMA thermo-analysis; (4) Mechanical properties of materials testing instrument; (5) SEM, AFM, FTIR, and Raman microscope; (6) X-ray diffraction; (7) elemental analysis; (8) GC-mass spectrometer; (9) laser light scattering etc.

The department accepts students studying towards Bachelor, Master, and PhD degrees in Engineering. Students are supported on a mixture of teaching and research assistantships and fellowships. The average time for completion of Bachelor degree is 4 years full time, Master degree with thesis is 2 years full time, for doctoral degree is 4.5 years full time. Currently we have around 457 undergraduate students, 177 MS degree graduated students, and 13 doctoral degree students.

### Mission Statement

The mission of the department is to educate chemical and materials engineers with solid skills and up-to-date knowledge required for chemical and materials engineering profession to cope with fast-paced changes in chemical and materials industry. To meet with this goal, undergraduate students are required not only to enhance their skills and knowledge in traditional chemical engineering process design and related fundamental theories, but also to enhance their understanding of the importance and application of material science, industrial pollution control and prevention, as well as process re-engineering to chemical industry.

In contrast, our graduate program focus more on training students to become senior chemical and materials engineers with independent research abilities. And with collaboration with the University's Environmental Technology Center , Fuel Cell Center , and Far Eastern Textile Co Research and Development Center , the department has made a very good progress to reach education goals in the past few years.

### Emphasis of The Department

#### Vision and Development Strategies:

Our vision is:

To foster innovative and technological talents and develop the unique characteristics of integrated research and development team.

To gradually meet with this vision, it is to build up the system at this stage among long-term development strategies for the following points:

1. Develop student’s practical skills and strengthen professional capability.

2. Keep promoting the teaching quality assurance system and improve the teaching environment.

3. Face up to the diversified admission program to recruit and develop outstanding high school students and pre-graduate students.

4. Strengthen the information technology environment construction and promote the establishment of e-Department.

5. Integrate a variety of counseling businesses.

6. Recruit internationally renowned visiting professors to raise academic standards.

7. Implement international cooperation and cross-strait academic exchanges.

8. Strive for the research and development programs from the government and enterprises.

9. Promote alumni service work and lifelong learning work.

10. Accomplish total quality management to enhance school quality and organizational effectiveness.

#### Department of teaching objectives and core competencies of the students:

It is based on the international engineering and technical education certification requirements to establish "Full Participation" and "Unremitting Improvement" goal of education and mechanisms.

It is also rooted in the "Professionalism" “Versatility" and “Globalization” concepts, developed in the department should have given students the educational objectives and core competencies.

1.Educational Objectives :

(1) Form a solid materials science and chemical engineering expertise for cultivating innovative and professional talents.

(2) Develop the communication, coordination, and team work spirits.

(3) Obtain the community care and the international perspective.

2. Students should graduate with core capabilities:

(a) The establishment of basic undergraduate education should have:

(1) Utilize mathematical, scientific and engineering know-how abilities.

(2) Design and conduct experiments, as well as to analyze and interpret data.

(3) Execute practical engineering skills and acquire well-utilized ability.

(4) Design engineering systems, components, or processing abilities.

(5) Communicate effectively in oral and attain the ability for team work.

(6) Obtain investigation, analysis and performing abilities.

(7) Identify current issues, understanding engineering technology to the environment,society and the global impact and to develop the habit of continuous learning ability.

(8) Understand professional & ethical attributes and social responsibility.

(b) To pursuit undergraduate program, graduate program focuses on "Specialty & Professionalism” as key objectives:

(1) Specifically professional knowledge.

(2) Design and executive research capabilities.

(3) Scientific research papers writing ability.

(4) Innovative thinking and independent problem solving capability.

(5) Communication and effectively coordinating capability with multi-disciplinary teams.

(6) Global vision.

(7) Leadership, management and planning capabilities.

(8) Life-long & self-learning ability.

## Department of Industrial Engineering and Management

### Introduction

Department of Industrial Engineering and Management (IEM) at Yuan Ze University concentrates on applications of adopting diverse engineering principles and management techniques to the design, improvement, and maintenance of a high level of productivity for both manufacturing and service industries. It concerns the integration of humans, materials, equipment, energy, and finance into productive systems. The current development of big data and artificial intelligence drive IEM further emphasizes the integration of computers, information, and state-of-the-art technologies to operate complex systems in the requirements of quick-response and diverse environments.

Adopting the market-driven strategy, the Department of Industrial Engineering and Management at Yuan-Ze University emphasizes the courses and research in the following areas:

1. High-tech and value-added manufacturing industry

The research direction is to apply industrial engineering techniques to high-tech industries to improve the manufacturing process and ultimately achieve the goals of quality, cost, delivery, and throughput.

2. Service industry

In the field of research, the objective is to apply industrial engineering techniques to service industries to improve enterprises' operation processes and eventually achieve full utilization of knowledge management.

### Facilities

1. Interaction Classroom

Interaction Classroom, organized with arc-shaped tables, provides a unique, innovative, interactive teaching environment. The speaker can use the central console in the middle of the classroom to give a lecture, which is convenient for the speaker and the students to discuss from multiple angles. The arc-shaped design of this classroom also makes it easier for students to learn and stimulate innovative thinking. The hardware includes a 55-inch ultra-thin embedded display, a digital camera, a multimedia integrated system, and an electronic interactive whiteboard.

1. Multifunctional Classroom

To provide better teaching, lectures, and a seminar environment for a large number of students, we design this classroom as a lecture hall. A 150-inch projection screen is installed in front of the classroom, while two 55-inch monitors are added in the middle. At the same time, considering the need for online teaching, the front and rear remote cameras are installed in the classroom. The rear camera lets online students see the teaching detail in the physical classroom, and the front camera enables the teacher to know the student's reactions to the class.

1. Information Technology Classroom

Information Technology Classroom provides 36 dedicated computers. Each computer is equipped with software commonly used in industrial engineering and management, which is convenient for students to learn and use. In addition to two large projectors in the front of the classroom, a computer broadcasting system is provided to broadcast the teacher's screen to each student's screen. This makes students can see the teaching materials and operation steps more clearly. Considering the need for online teaching, the classroom is equipped with remote cameras to enhance the interactive effect of online courses.

1. Study Lounge

Lounge is reserved exclusively for Industrial Engineering and Management students to study, read, or hang out between classes or any other time of the day.

1. Learning Corners

Students can use learning corners for discussion and fun.

### Research Interest

#### Smart Production

Students who focus on smart production in the IEM program study:

Production and distribution systems: material handling systems, material requirements planning, facility planning, capacity expansion, adaptive forecasting, multistage sequencing, and lean manufacturing

Optimization: large-scale optimization, convex optimization, location theory, network optimization, integer programming, optimization of traffic networks, multiple criteria decision-making, robust optimization, and compressed sensing

Quality engineering: total quality systems, process improvement strategies, design for quality, statistical modeling of tolerances, Taguchi loss function, and continuous quality improvement

Simulation: production modeling, operational scheduling, plant design and layout, process flow analysis, and robust optimization

Faculty members who specialize in smart production are:

* Dr. Tsai, Du-Ming
* Dr. Chen, Yun-Shiow
* Dr. Cheng, Chuen-Sheng
* Dr. Liang, Yun-Chia
* Dr. Tseng, Yuan-Jye
* Dr. Tsai, Chi-Yang
* Dr. Jen, Hen-Yi
* Dr. Wu, Gen-Han
* Dr. Huang, Hao
* Dr. Chen, Pei-Wen

#### Supply chain, Services, and Health

Students who focus on supply chain, service engineering, and health systems engineering in the IEM program study:

Supply chain and logistics: network design, enterprise integration, supply chain coordination and collaboration, contracting mechanisms, congestion modeling, and transportation modeling

Service engineering: retail engineering, workforce modeling, data mining, demand management, pricing, employee training, employee retention, and resource allocation

Health systems engineering: health information technology, patient flow modeling, capacity management, staff scheduling, quality improvement, data visualization, health informatics, and cost-effective modeling

Faculty members who specialize in supply chain, services, and health engineering are:

* Dr. Chen, Chi-Kuang
* Dr. Ting, Ching-Jung
* Dr. Sun, Tien-Lung
* Dr. Lin, Chen-Ju
* Dr. Jen, Hen-Yi
* Dr. Wu, Gen-Han
* Dr. Huang, Hao

#### Human Factors/Ergonomics

Students who focus on human factors/ergonomics in the IEM program study:

Ergonomics: workplace analysis, mental workload evaluation, biomechanics, modeling crash impacts, human reliability modeling, safety planning, and work physiology

Human-centered design: ergonomic product design and analysis, design cognition, human and social dynamics in design, and problem-solving enabling methods

Human-computer interaction: human-computer interface and information visualization

Human-machine systems: human-in-the-loop simulation, behavioral decision-making modeling, human performance modeling, machine learning, and eye-tracking systems

Faculty members who specialize in human factors/ergonomics are:

* Dr. Tsai, Chieh-Yuan
* Dr. Su, Chuan-Jun
* Dr. Sun, Tien-Lung
* Dr. Lin, Ray F.
* Dr. Chou, Chin-Mei

#### Big Data Analytics

Students who focus on big data analytics in the IEM program study:

Applied probability and stochastic systems: queuing systems, stochastic networks, control of telecommunications and information systems, call center modeling, and large-scale service systems

Statistics applications: statistical learning theory, spatial statistics, time series models, response surface methods, analysis and design of experiments, and large-scale statistical inference

machine learning: decision tree, Bayesian network, neural networks, recurrent neural networks, convolution neural networks, deep learning, attention mechanism

Faculty members who specialize in big data analytics are:

* Dr. Tsai, Chieh-Yuan
* Dr. Tsai, Du-Ming
* Dr. Chen, Yun-Shiow
* Dr. Su, Chuan-Jun
* Dr. Sun, Tien-Lung
* Dr. Lin, Chen-Ju
* Dr. Chen, Pei-Wen

### Mission Statement

### Master Program

Regulations for Course Selection

* The minimum total credits required for graduation for the master's program is 32 credits, including 2 credits of a required course (IE586 "Seminar"), 24 credits of elective courses, and 6 credits of the master's thesis.
* Among the elective courses, students are required to choose one of the two categories, either " Optimization and Global Logistics Management" or "Intelligent Manufacturing and Big Data Analysis," as their primary focus and take at least 4 courses (12 credits) from that category. The other category will be taken as a secondary focus, and students must take at least 2 courses (6 credits) from it, making a total of 6 courses (18 credits). The remaining 6 credits can be freely chosen from any other courses.
* Students must obtain the consent of their advisor and the department chair before taking elective courses from other departments, with a maximum of 9 credits.
* Students who wish to take courses across different academic programs must fill out the "Cross-System Courses Application Form" provided by Yuan Ze University. A maximum of 6 credits of such courses may be counted toward graduation.
* Foreign students (excluding overseas Chinese and students from Mainland China) are exempt from taking the course "IE586 Seminar." However, they still need to fulfill the minimum required credits for graduation.
* For undergraduate graduates from non-industrial engineering-related departments, they must choose either Option A or Option B for remedial courses (graduate courses may be counted toward graduation credits):  
  Option A: one undergraduate course “IE335 Production Planning and Control I” and one from the following graduate courses: “IE531 Advanced Quality Control,” “IE533 Probabilistic Analysis,” or “IE538 Experimental Design.”  
  Option B: one undergraduate course “IE350 Quality Control (including experiments)” and one from the following graduate courses: “IE534 Production Scheduling,” “IE543 Production Planning,” or “IE593 Advanced Production Control.”
* All graduate students shall complete Academic Research Ethics Education Course before the end of their first academic semester, according to the Yuan Ze University Academic Research Ethics Education Course Implementation Guideline. Students not passing the Academic Research Ethics Education Course cannot apply for their academic degree exam.

Thesis Proposal Examination

Master students are required to select an advisor and submit an advisor agreement form to the department office within one month after the start of their first semester. The thesis proposal review committee, composed of two full-time assistant professors or above (including the advisor), will review and examine the thesis proposal and its relevance to the Industrial Engineering and Management professional field. The thesis proposal examination and master degree examination must be held at least two months apart.

Master Degree Examination

The master degree examination must be completed within the deadline specified by the university by submitting an online application for the examination. The master's degree examination committee consists of three to five members. Before the degree examination, the student should complete the originality check for the thesis, and the standard for the comparison report is not to exceed 20%. On the day of the degree examination, the student should submit the "Originality Check Report of the Thesis" to the advisor and the degree examination committee for reference, and undergo the thesis defense and professional field compatibility check. After completing the degree examination, the student should conduct an originality check on the final version of the thesis again. After the advisor confirms it, the "Originality Check Form for Thesis Final Draft," "Originality Check Report of the Thesis," and the thesis should be submitted to the department office for record. Any other matters related to the degree examination shall be handled in accordance with the university's "Academic Regulations" and "Graduate Degree Examination Regulations for Master's and Doctoral Programs."

### Doctoral Program

Note: The following regulations are applicable for the students enrolled in the academic year 2023/2024. For other academic years, please refer to the one in the right sidebar.

### **Course Requirements**

A minimum of 33 credit hours are required for graduation, which includes 3 credit hours for compulsory courses, 24 credit hours for elective courses and 6 credit hours for dissertation. Graduate students must complete the Academic Research Ethics Education Course according to the regulations of Yuan Ze University Academic Research Ethics Education Course Implementation Highlights, before the end of the first academic semester. At the latest, the course must be completed and passed before the Advanced Examination application. The student will not be allowed to proceed the Advanced Examination without completing the Academic Research Ethics Education Course completion.

### **Advanced Examination**

Student is required to complete the Fundamental Qualifying Examination and the course requirements before applying for the Advanced Examination. The Advanced Examination related rules are as follows:

1. PhD Graduate students should complete the Advanced Examination within the first 4 academic years (not including temporary leaves).
2. Prior to the Advanced Examination, the student must turn in the Application Form of the PhD Advanced Examination.
3. In accordance with the specialty and requests of dissertation committee members, the examination may be conducted in written, oral or both formats. The committee must be comprised of a minimum of three members (include the dissertation advisor), at least 1/3 of which should be associate (or above level) professor.
4. Upon completions of the Fundamental Qualifying Examination and Advanced Examination, the student becomes a PhD candidate.

### **Dissertation Proposal Defense**

Three months after passing the Advanced Examination, the PhD candidate can apply for the Dissertation Proposal Defense and form the dissertation committee comprising at least 5 members (including dissertation advisor) from in and outside of YZU with 1/3 or above from each. The related rules are as follows:

1. The committee members from the IEM department shall be the same as in the Advanced Exam. If any changes are needed, the PhD candidate must apply and obtain the committee agreement with IEM approval.
2. The committee is responsible for conducting oral examination with respect to the proposal and its relevance to the Industrial Engineering and Management professional field. A written examination of a specialized subject related to the proposed research may be requested by the committee.
3. Prior to the Proposal Defense, the PhD candidate must turn in ”Dissertation Proposal Check List”, ”Dissertation Advisor’s Recommendation” and ”Dissertation Proposal Form”. The student must turn in ”Dissertation Proposal Approval Form” after passing the Dissertation Proposal Defense.

### **Dissertation Defense**

Dissertation Defense can only be applied after three months of the Dissertation Proposal Defense and the completion of publication requirements. The related rules and regulations are as follows:

1. Two or more articles must be published in renowned journals, with at least one in SSCI/SCI class journals or two in EI class journals. The published articles must originate from and directed related to the dissertation and must be accepted with proven acceptance letters to satisfy publication requirements. Other than student’s dissertation adviser, the student needs to be the first author of the published articles. If the following situations occur, the number of papers will be counted differently:  
   i. Articles with author(s) who is (are) not the student’s committee member(s): can only be counted as one-half paper.  
   ii. Articles with authors of other students: can only be counted as one-half paper.  
   iii. Articles with both cases i.) and ii.): can only be counted as one-fourth paper.
2. One or more conference papers are published in domestic or international conference proceedings and presented in international conference.
3. Committee members should be the same for both the Dissertation Proposal Defense and the Dissertation Defense. If not, the student must apply and obtain the committee agreement with IEM approval.
4. PhD students should complete the originality check for their dissertation before the defense, with a standard no higher than 20% for the comparison report. On the day of the defense, students should submit the "Dissertation Originality Comparison Report" to the advisor and the committee for review, and undergo an oral examination and a professional field conformity check. After completing the defense, students need to conduct another originality check on the final version of the dissertation and have it confirmed by the advisor. The final version of "Dissertation Professional Field Conformity Check Form," "Dissertation Originality Comparison Report," and the dissertation should be submitted to the department office for record.
5. Prior to the Dissertation Defense, the PhD candidate must turn in the ”Dissertation Defense Check List”. After the Dissertation Defense, the ”Final Defense Grading Report” and the ”Dissertation Defense Report Form” must be turned in to the IEM office.

## International Bachelor Program in Engineering

## Program Characteristics

# International Bachelor Program in Engineeringr is founded in 2017. We emphasize basic educations and integrate resources between departments. At the same time, many excellent teachers will provide curriculum diversification in different fields. The characteristics of this program are described as follows.

* To cultivate the student ability for international competitiveness

The development of a bilingual university is our primary goal. In order to achieve this target, we have started to promote English teaching in each class since 2002. Recently, in response to international trend, we specially launch an English Bachelor Program in College of Engineering so that the professional knowledge, foreign language skills, and international vision of students can be enhanced. Furthermore, via many opportunities of attending international internships and exchange students, we try to build a complete model of the international teaching environment to cultivate the student ability for international competitiveness.

* To foster the student to become interdisciplinary professional engineers

The program based on the student-oriented learning environment is provided for creating an engineering interdisciplinary learning platform and extending students' knowledge. Therefore, learning from multiple combinations of interdisciplinary programs can foster the student to become interdisciplinary professional engineers.

* A「single major」or a「double major」programs

The program can provide an undergraduate student who completes one or two sets of degree requirements. At the first year, students will choose the general engineering courses for gaining the general knowledge of engineering background. In the second to fourth years, according to personal interests, students can choose one major as a「single major」from three fields (i.e., Department of Mechanical Engineering, Department of Chemical Engineering and Materials Science, and Department of Industrial Engineering and Management) or complete two sets of these three departments as a「double major」. There is sometimes a difference when it takes to pursue a double major compared to a single major, such that it may need to study more hard but the added benefits of a second major include the opportunity to increase your knowledge and the expectation of increased earnings and competitiveness.

## Curriculum Design

The College of Engineering of Yuan Ze University includes three departments which are Department of Mechanical Engineering, Department of Chemical Engineering and Materials Science, and Department of Industrial Engineering and Management. The teaching focus and development goals of each department are as follows:

* Department of Mechanical Engineering:Special emphasis on "innovation and implementation", in accordance with industry expertise and requirement to link, integrate curriculum, and implement of curriculum diversion design. The development is focused on heat and new energy, nanomaterials and solid mechanics, biomedical opto-mechatronics, and Industrial 4.0 - Intelligent Manufacture system.
* Department of Chemical Engineering and Materials Science: To cultivate students' ability of both professional accomplishment and hands-on practice. Also, to nurture students to become a well-educated and talented person in polymer optoelectronics / biomedicine, nanomaterials, energy components, material identification and analysis, professional fine chemical industry and biotechnology and other related industries.
* Department of Industrial Engineering and Management: Cooperated with the domestic business environment, nurturing students to become a system of management and automated production of professionals. Also, actively cooperate with local industries to lead the industry to upgrade. In order to cope with the trend of technology and development, the program will be focused on high-value-added manufacturing management, quality and service management, enterprise integrated information management, interactive digital technology, mobile e-commerce and supply chain management.

The program can provide an undergraduate student who completes one or two sets of degree requirements. At the first year, students will choose the general engineering courses for gaining the general knowledge of engineering background. In the second to fourth years, according to personal interests, students can choose one major as a「single major」from three fields (i.e., Department of Mechanical Engineering, Department of Chemical Engineering and Materials Science, and Department of Industrial Engineering and Management) or complete two sets of these three departments as a「double major」which students will have two engineering professional capabilities.

## Bilingual Education

Since 2002, the university has been promoting bilingual university as the general goal of school development. Since 2002, it has been promoting the teaching of English in various schools and becoming the starting point of international education. Nowadays, it is inevitable that fluent English is only a foundation. Therefore, the bilingual university has a new definition so the university is planning a new generation of "bilingual education".

※ Programming language courses

In response to the wave of the industry 4.0, a combination of robots, automated production lines, networking, manufacturing intelligence (i.e., Intelligent Manufacturing) and big data analysis is the future mode of production technology. Hence, having the information capabilities of engineering talent are important. This course is designed for students who are required to complete the compulsory programming language courses in the first and second semesters of the first year. In addition, in the second to fourth years, according to personal interests, students can choose one major as a 「single major」 or complete two sets of these three departments as a 「double major」which students are also planned to enhance the students' information skills.

※ Second foreign language

The International Language and Culture Center provides students with elective courses in many languages ​​including Japanese, Thai, German, French, Spanish and Korean. At present, we have planned to let student study the Spanish course during the internship, so that students can not only improve their English ability but also learn a second foreign language while practicing internship abroad.

## Double Major

The students will be able to learn the engineering contents and development direction of each engineering field and learn engineering related knowledge extensively in the course of their freshman year. According to their personal interests, they will have a chance to learn about mechanical engineering, chemical engineering and materials science, and industrial engineering and management in the three areas of a *single major* or a *double major*.

In the past, students had to study second specialties in addition to their majors. They were usually required to complete 128 credits of graduation credits for their majors plus another all compulsory courses for the 2nd major. However, if they take second specialty as a minor, the supplementary courses will also be subject to more than 27 credits, resulting in a heavy burden on the students.

This program is designed to allow students to complete two areas of specialization within 128 credits, so students can choose from the following:

1. "Double Major 1": "Mechanical Engineering" + "Chemical Engineering and Materials Science"
2. "Double Major 2": "Mechanical Engineering" + "Industrial Engineering and Management"
3. "Double Major 3": "Chemical Engineering and Materials Science" + "Industrial Engineering and Management"

With the rise of technological innovation and the rise of new industries, the future task of engineering talent tends to diversify, not only to have specific areas of expertise, but also to mix different professional skills to integrate. Therefore, in recent years, university education has gradually attached importance to a variety of professional skills of cross-disciplinary personnel training. The combination of "Double Major", which is planned in this course, will train students to develop two specialties and expand future employment competitiveness, thus becoming a cross-disciplinary professional engineering talent.