



東海大學

Tunghai University

College of Engineering

I-Kuan Yang, Ph.D.

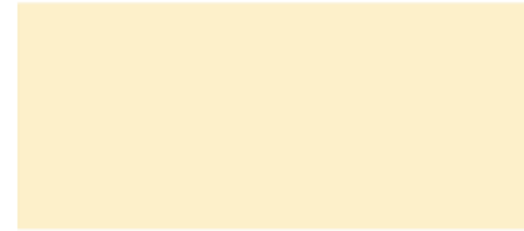
Dean, College of Engineering

Professor, Dept. of Chemical and Materials Engineering

THU- College of Engineering Profile



- Established in 1960.
- Reorganized in 2007.
- Five departments:
 - Chemical and Materials Engineering(CME)
 - Industrial Engineering and Enterprise Information (IEEI)
 - Environmental Science and Engineering(ESE)
 - Computer Science(CS)
 - Electrical Engineering (EE)
- Enterprise Innovation and Automation Center(EIAC)
- Digital Innovation Master Program
- Entrepreneur Thought & Action Credit Program





Features of THU-College of Engineering

1. All the departments are accredited by The Institute of Engineering Education Taiwan (IEET).
2. Focus on the linkage of *theory and practice*, *teaching and research* equally emphasized, corporation between *university and industry*, *multi-discipline integration*, *globalization*.
3. Foster good engineering students with the capability of *theory, practice, innovation, design, research and integration*.



Major Fields of Each Department

东海大学

Department	Fields
Chemical & Materials Engineering(13)	Materials engineering, Bio-chemical engineering, Process and Energy engineering (green process, green materials, high value-added bio-chemical & medical materials)
Industrial Engineering and Enterprise Information(15)	Green supply chain management, Electronic Business & Automation System, Lean production system, Health care and hospital management
Environmental Science and Engineering(11)	Recycle and reuse and reduction (3R) of energy, water, and material resources Reduction of corporate carbon emissions Reduction and control of processing wastewater and waste air. Environmentally benign manufacturing processes
Computer Science(19)	Cloud Computing, Internet of Things, and Big data
Electrical Engineering(9)	Nano Electronic Material and Energy Resource Technology, IC & wireless communication



Department of Chemical and Materials Engineering

◎ About The Department

- ❑ The Department of Chemical Engineering was established in 1955.
- ❑ Master program in Chemical Engineering started in 1990, Doctor program was initiated in 2000.
 - ▶ Renamed to Chemical and Materials Engineering in the fall of 2008.
 - ▶ Accredited by Institute of Engineering Education Taiwan (IEET) in 2009.
 - ▶ The students admitted each year are 120 undergraduates , 34 graduates including 31 in MS and 3 in PhD programs. Total enrollments are 515 students.
- ❑ Thirteen full-time faculties, all holding PhD degrees in either chemical or materials engineering, are taking care of all the core courses and the consulting work of students. Teaching excellence, profound researches, and industrial services are always emphasized.
- ❑ Several distinguished adjunct professors from industries and research institutes are invited to share their invaluable experiences in various courses



Success

Project of **Cell Migration Chip** funded for incubation

Awards

First Place Award in 2013 Process Design Contest for Undergraduate students held by Taiwan Institute of Chemical Engineers

Innovative Science and Technology Award in 2013 Science and Technology Contest held by China Technical Consultants Inc., Foundation (CTCI)





Department of Chemical and Materials Engineering

Research focuses on three major fields



Advanced material engineering

1. Polymer nanocomposites
2. Biomedical materials
3. Biodegradable polymers

Biotechnology

1. Design and control of biochemical reaction
2. Culture techniques of medicinal and edible mushrooms
3. Protein synthesis and separation techniques
4. Recycle and reuse of food wastewater or waste product
5. Bio-dialysis of toxic organic compound

Process systems engineering

1. Process control (plant-wide control)
2. Optimization of process flow sheets
3. Process synthesis
 - ◆ Heat exchanger networks (HEN)
 - ◆ Synthesis of reactor networks
 - ◆ Synthesis of distillation sequences
4. Process modeling
5. Research and development of azeotropic distillation system and reactive distillation system
6. Application of artificial intelligence
7. Design and operation of batch process
8. Management and reduction of process energy
9. Cleaner production



Research Facilities

SEM AFM XRD TGA DSC DMA BET RDAII Twin Screw Extruder
HPLC GC Fermentation system 、 Single Screw Extruder 、 Injection Molding Machine



Department of Industrial Engineering and Enterprise Information(IEEI)

- Established in **1963** as the first Industrial Engineering Department in Taiwan.
- **Master** program was established in **1989**.
- **Ph.D.** program was established in **1999**.
- IE department was officially renamed as the Department of Industrial Engineering and Enterprise Information (**IEEI**) in **2001**.
- Executive Master of Healthcare Administration (**EMHA**) program was established in **2005**.



Curriculum and Academic Semester

Three Professional Groups

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A. Operations Research & System Engineering

Courses

- Probability
- Reliability Engineering
- Systems Simulation
- Probabilistic Models in Operations Research
- Advanced Statistics



Professional Field

- Industrial/Manufacturing engineer
- Performance manager
- Operation analysts
- Cost control manager
- Production engineer

B. Electronic Business & Automation System

Courses

- Network and Database Program Design
- Enterprise Information System
- Computer Integration and Flexible Manufacturing
- Supply Chain Planning and Collaboration Planning
- Data Analysis and Decision-making Models



Professional Field

- Industrial/Manufacturing engineer
- Process engineer
- CIM (Computer Integrated Manufacturing) Automation engineers
- Process engineer
- MIS (Management Information system) engineer
- ERP (Enterprise resource planning) engineer

C. Business Management

Courses

- Toyota Production System
- Product Development Management
- Quality Control
- Human Resource Management
- Financial Analysis & Management



Professional Field

- Industrial/Manufacturing engineer
- Quality engineer
- Human resources manager
- Human factors engineer
- Customer relationship manager
- Performance manager
- Operation analysts

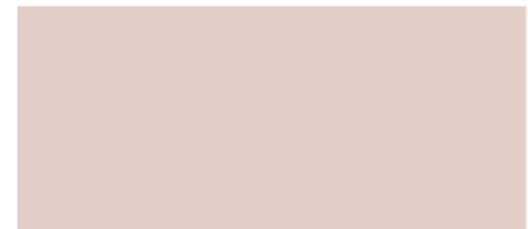
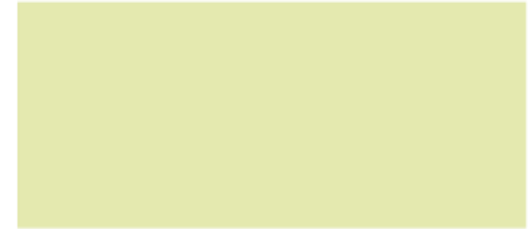
Health care and hospital management



Department of Industrial Engineering and Enterprise Information(IEEI)

Research foci

- Green supply chain management,
- Electronic Business & Automation System,
- Lean production system,
- Health care and hospital management



Department of Environmental
Science and
Engineering
(ESE)

Program Education Goals

Undergraduate Program: **Bachelor of Science**

ESE offers a B.S. program to train undergraduate students with strong theoretical foundation and practical experience in both environmental science and engineering.

Graduate Programs:

Master of Science **Doctor of Philosophy (Ph.D.)**

ESE also offers a M.S. & a Ph.D. program to further enhance graduate students' hand-on experiences and abilities in logical and independent thinking via participating extensive research projects. Besides, a five-year B.S./M.S.



Research Fields

Synthesize carbon nano-materials with application in pollutant extraction

Advanced oxidation

Photocatalysis mechanism associated with nano TiO₂ modified with metals

Synthesis of superparamagnetic materials and mesoporous materials

Phytoremediation of heavy metal contaminated soils

Trace-level selenium analysis for water, sediment & tissues

Isolation & characterization of ammonia oxidizing archaea

Conversion of cellulosic materials to biohydrogen through cellulose hydrolyzing bacteria

Developing real-time monitoring system for particular virus detection

Biological treatment of nutrients and noxious pollutants.

Carbon asset management through waste/energy integration

Environmental planning & management

Environmental information & knowledge management

Dynamic system analysis on sustainable development

Tracing emission source of air pollutants through modeling



Physical and Chemical Sciences and Engineering

Biological Sciences and Engineering



Management and System Analysis





Department of Computer Science

□ Undergraduate programs

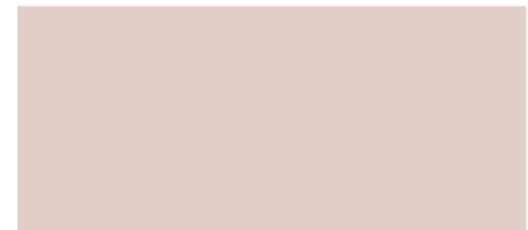
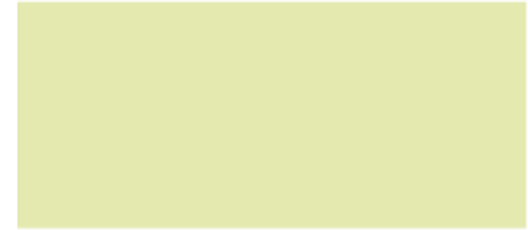
- ▶ Day Division (481 students)
 - ▶ Digital Innovation
 - ▶ Software Engineering
 - ▶ Information & Electrical Engineering
- ▶ Evening Division (123 students)

□ Graduate programs

- ▶ Regular (58 students)
- ▶ Continuing Education (36 students)

□ 18 full-time teachers

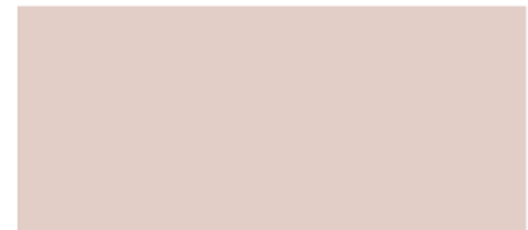
- ▶ 7 professors, 7 associate professors, 4 assistant professors.





Fields of Research

- **Cloud Computing**
- **Internet of Things**
- **Big data**
- **Creative Internet Applications**
- **Information Systems**
- **Information Security**
- **Digital Content Application**
- **Software Engineering**
- **High-Performance Computing**
- **Medical Image Processing**
- **Multimedia and Networking**
- **Embedded Interactive System**
- **System Simulation**





Department of Electrical Engineering

Nano Electronic Material and Energy Resource Technology

IC & wireless communication

Nano Electronic Material and Energy Resource Technology

Integrated Circuit Design

Wireless Communication and Networking

We shall attempt to apply Nano material, which has very special physical and chemical properties, in technologies such as advanced Green Energy, Luminescence, Bio-Technology, and Semi-Conductor based Industry.

Our interest is channeled towards Digital/Analog VLSI Design, VLSI Signal Processing and Design, Communication Integrated Circuit Design, and SIP/SoC System Integrated Chip Design.

Our focus is on Communication System Design, Radio Frequency and Microwave Circuit Design, Telematics and Network Technology, and Internet Security.

Digital Innovation Master Program

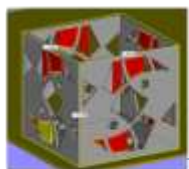
- ❑ Achieve interdisciplinary innovation and applications through digital technologies
- ❑ Emphasize the development and practice of digital innovation as well as the researches related to digital aesthetics and interactive technologies.
- ❑ Investigate User Experience of Greater China in terms of dieting, clothing, accommodation, transportation, education, and recreation.



作品設計原稿



虛擬情境展示



3D列印模型設計



3D列印結果



LED燈座



實際作品一



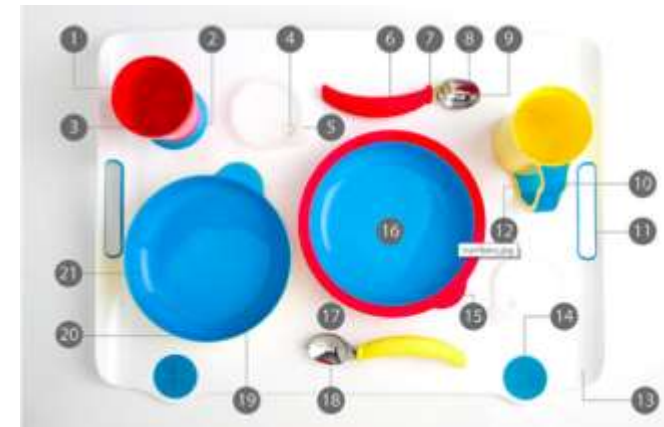
實際作品二



Enterprise Digital Innovation & Automation Center (EDIAC)

◎ Current major research directions

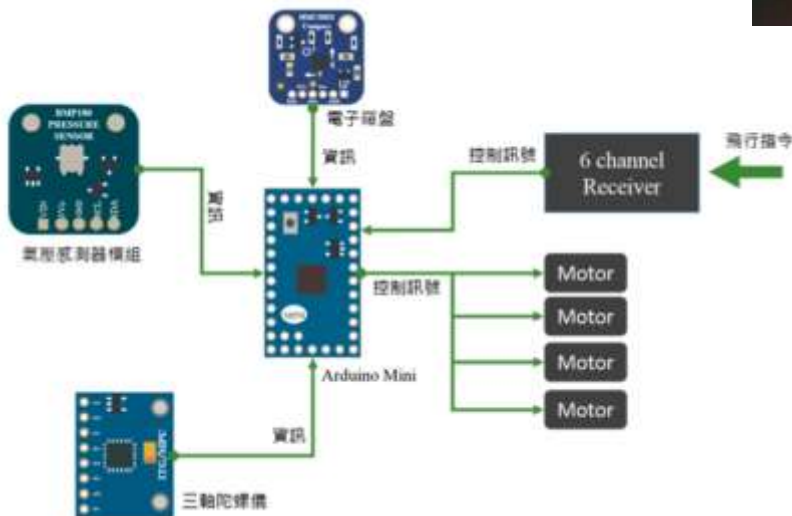
- ❑ Industry 4.0
- ❑ Digital Manufacturing
- ❑ Enterprise Digital Innovation
- ❑ Enterprise Software Engineering.



Activities

❑ advocate cross-department programs, including Automation Program, Integration of Manufacturing and Commerce Program, Polymer Materials Program, and Entrepreneurs Thought and Action Bachelor Course Program.

❑ Provides training workshops to the outside communities, include Innovation Workshop, User Experience Workshop, Arduino Workshop, 3D Printing Workshop, and Mobile and Cloud Workshop.



Internationalization

- ❑ Freshman Elite Program
- ❑ Xuehai Flying Plan
- ❑ University of New South Wales Dual Degree Program
- ❑ University of Rhode Island 3+2 Dual Degree Program
- ❑ Short-Term Overseas Summer Program
- ❑ Cross-Strait Exchange Program
- ❑ ...



Chia-Ling Chen from Taiwan obtained her PhD degree for the Logistics Management Systems programme in 2004. She did her traineeship at ASML.

"ASML has a cooperation programme with TU/e in which people study LMS for two years and then work at ASML for three years. The principal project is the in-company design project, for which I compiled a suitable tool kit for maintenance and repair. In addition, I followed Master's courses and special workshops for LMS students. A design education lets you combine academic and practical business experience and gives you a good idea of how you can put your university knowledge to good use within a company."



University-Industry Collaboration

- University-industry research collaboration projects
- Student internship in industry
- University-industry joint curriculum
- Industry mentor
- Consulting service
- Executive education
- ...



2015年4月號

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數位製造與創新技術聯盟



THANK
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