

工程導論各主題課程授課教師表

課程主題	授課教授
能源	衛子健 老師
機械工程	王訓忠 老師
虛擬材料設計選用	葉安洲 老師
最佳化與工業工程	洪一峯 老師

## 一、課程說明(Course Description)

### ※能源

The course aims to give a general understanding of contemporary energy issues from engineering/technical as well as economical/social points of view. It provides freshmen of the College of Engineering with global vision of energy-related topics before more detailed studies of materials, devices, processes, etc. in their subsequent years of professional development

### ※機械工程

本課程介紹動力機械工程在新世代科技發展中扮演的角色，新世代中機械工程除傳統的熱流與能源、機械設計與製造、電控、固體力學外，已涵蓋人工智慧(AI)、工業 4.0、光機電整合、生醫工程等領域，課程中除邀請各領域教授作簡介外，並將邀請清大賽車工廠(NTHU Racing)與學生機器人團隊(DIT Robotics)同學們介紹他們的學習經驗。

### ※虛擬材料設計選用 – Cyber Materials Design and Selection

Case studies such as materials for jet engine and automobile will be used to demonstrate cyber materials selection and design by ANSYS Granta Edupack. This course utilizes a design-lead approach to introduce materials science, then the choice of materials and processes needed to achieve the microstructure and properties are described, finally the scientific aspects of the subject can be introduced in more details in order to build up the understanding of Structure-Process-Property correlation.

### ※最佳化與工業工程

介紹工業工程部分的重要技術，包含生產管理概念、作業研究、線性規劃及整數規劃之建模技術、最佳化演算法與實例，並利用套裝軟體實做數學規劃之建模與求解。

## 二、指定用書(Text Books)

None

## 三、參考書籍(References)

### ※虛擬材料設計選用

Materials, 3rd Edition, Engineering, Science, Processing and Design, eBook ISBN: 9780080982816

Materials Selection in mechanical design / Michsel F. Ashby. – 4th ed. ISBN: 9781856176637

#### 四、教學方式(Teaching Method)

##### ※能源

Lectures with PPT/video presentations

##### ※機械工程

課堂講說 (Class lectures)

##### ※虛擬材料設計選用

Power-point slides lectures

Introduction of ANSYS Granta Edupack

#### 五、教學進度(Syllabus)

##### ※能源

1. Introduction to Engineering
2. Depletion of fossil fuels and extreme climates
3. Fossil, nuclear, and renewable energies
4. Energy generation – solar cells
5. Energy storage – lithium ion battery, hydrogen economy, fuel cells
6. Energy saving – smart grid

##### ※機械工程

第一週：機械工程簡介/AI在機械工程中的應用

Week 1: Introduction to Mechanical Engineering/Applications of AI in ME

第二週：學生在機械工程整合學習的實例--NTHU Racing團隊

Week 2: Experience of Integrated Learning—NTHU Racing Team

第三週：控制、感測與機電系統整合I

Week 3: Control, Sensors and Actuators, Mechatronics I

第四週：控制、感測與機電系統整合II--DIT Robotics團隊

Week 4: Control, Sensors and Actuators, Mechatronics II-DIT Robotics Team

第五週：智慧精密製造與智慧機械領域

Week 5: Smart Precision Manufacturing and Smart Machinery

第六週：奈微米科技與應用領域

Week 6: Nano- & Micro-Technology and Applications

第七週：熱流與能源領域/期末考

Week 7: Thermal-Fluid and Energy/Final Exam

##### ※虛擬材料設計選用

1. Introduction of the course
2. Introduction of various materials
3. Materials card game

4. Cyber materials selection and design / case studies
5. Group exercise with Materials selection with Ansys Edupack
6. Summary and conclusion

※最佳化與工業工程

1. 作業研究
2. 線性規劃
3. 整數規劃
4. 生產管理

六、成績考核(Evaluation)

※能源

- In class note 40%
- Self-learning report 20%
- Final exam 40%

※機械工程

- 課堂聽課心得(60%)；學期報告(20%)、期末考(20%)
- Class Notes (60%)；Term Report (20%)； Final Exam (20%)

※虛擬材料設計選用

- Group report (50 %)
- Final exam (50 %)

※最佳化與工業工程

- Detail to be announced in the first class