一、課程說明(Course Description)

※能源

This series of 7 lectures are aimed to give a general understanding of contemporary energy issues from engineering/technical as well as economical/social points of view. The course is to provide 1st-year students in 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 developments.

※智慧機械

本微課程的目的在於提供學生對智慧機械的了解，課程將以五週深入淺出課堂講解以及兩週的實際驗證讓學生能夠透過課堂上與教授的雙向交流、以及以三人為一組實際進行 Project Base Learning 製作並測試自駆車和機械手臂，來探究並了解智慧機械的基本組成、以及智慧機械在不同領域的應用和機會。

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

Case studies such as materials for jet engine, automobile, robotic arms, and pressure vessel…etc will be used to demonstrate cyber materials selection and design by CES Edupack. This course utilizes a design-lead approach to introduce materials science in order to highlight various properties requirements for materials, then the choice of materials and processes needed to achieve the state of structure for materials to obtain these 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. The cyber materials selection and design exercise conducted in this course can be related to the module given by Power Mechanical Engineering department, allowing students to understand the interdisciplinary aspects of Materials Science and Engineering.

※最佳化與工業工程

簡介工業工程領域之若干主題，包含作業研究、機率、生產管理、品質管理、網路問題、人因工程、供應鏈管理。另外，深入介紹線性規劃、整數規劃之最佳化技術，及其數學建模之方法與實例應用，並利用套裝軟體實際求解問題。

二、指定用書(Text Books)

無

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

四、教學方式(Teaching Method)

※能源

Lectures with PPT/video presentations.

※虛擬材料設計選用

Power-point slides lectures

Encourage peer instruction

CES Edupack software

五、教學進度(Syllabus)

※能源

Seven 2-hr lectures:

1. Energy: the foundation of societal prosperity and development
2. Fossil energy: environmental issues, global warming and CO_2 emission.
3. Nuclear energy: reactor types, operational safety and waste storage
4. Wind, hydraulic, geothermal and oceanic energy
5. Solar cells: silicon-based, organic, and dye-sensitized devices
6. Energy storage: secondary batteries
7. Summary: resource availability, cost/gain evaluation, and future prospects

※智慧機械

第一週　機械工程與力學導論
第二週　機械元件與設計
第三週　熱流力學與能源
第四週　PBL Project I 測試: 老鼠夾自驅車
第五週　機器人與機電整合
第六週　工業 4.0 與智慧製造
第七週　PBL Project II 測試: 機械手臂

※虛擬材料設計選用

1. Introduction of the course
2. Cyber materials selection and design
3. Case studies I (e.g. jet engine, automobile or others)
4. Case studies II (e.g. robotic arms, pressure vessel or others)
5. Fundamentals of Materials Science
6. Various types of Materials
7. Conclusions and future prospects

※最佳化與工業工程

1.生產管理
2.供應鏈管理
3.品質管理
4.機率模式與決策方法
5.網路分析
6.線性規劃
7.整數數規劃

六、成績考核(Evaluation)

※能源

In-class question sheets (35%) and final exam (65%).

※智慧機械

上課心得: 共五次共佔 30%

PBL Project I: 測試結果 25% 心得報告(ppt) 10%

PBL Project II: 測試結果 25% 心得報告(ppt) 10%

※虛擬材料設計選用

Report of cyber materials selection and design (20 %)

Final exam (80 %)

※最佳化與工業工程

Detail to be announced in the first class