教學大綱(Syllabus)-大學部四年級

系務會議通過修訂日期：2007/9/12
updated: 2007/10/04

<table>
<tr><td>課程編碼
(course no.)</td><td colspan="2">U056</td><td>學分
(credits)</td><td>3</td></tr>
<tr><td rowspan="2">課程名稱
(course name)</td><td colspan="4">(中)　腐蝕與防蝕</td></tr>
<tr><td colspan="4">(Eng.)　Corrosion and Corrosion Control</td></tr>
<tr><td>開課系所班級
(dept. & year)</td><td colspan="2">材料科學與工程學系大學部四年級
(Dept. of Mat. Sci. & Engr., Senior)</td><td>授課教師
(teacher)</td><td>顏秀崗 教授
(Prof. Shiow-Kang Yen)</td></tr>
<tr><td>課程類別
(course type)</td><td>選修
(Elective)</td><td>授課語言
(language)</td><td>中文
(Chinese)</td><td>開課學期
(semester)</td><td>下學期
(　Spring　)</td></tr>
<tr><td rowspan="2">課程簡述
(course description)</td><td colspan="3">（中）本課程乃為具有大學化學及材料科學相關基礎之研究所同學開設，希望藉此課程使學生對金屬材料在環境中之腐蝕原理及防制方法廣泛了解，並做為爾後深入腐蝕相關研究之基礎。主要授課內容如下:
I.　腐蝕原理
1. 簡介
2. 電化學機構
3. 腐蝕電動勢及電極電位
4. 極化及腐蝕速率
5. 鈍態</td><td colspan="2">II.　腐蝕實例探討
1. 應力腐蝕及氫脆
2. 大氣腐蝕及土壤腐蝕
3. 氧化反應
4. 散亂電流腐蝕
5. 微生物腐蝕
III. 防蝕方法
1. 陰極防蝕
2. 塗層及抑制劑
3. 材料選擇與設計</td></tr>
<tr><td colspan="3">(Eng.) This course is designed for graduated students who have learned chemistry and material science related, and provides the extensive knowledge about corrosion principles in metal and how to control corrosion as well, which can also be the basis of the further researching in corrosion related fields. The main contents include:
I. Principles of Corrosion
1. Introduction
2. The Mechanisms of Electrochemical
3. EMF of Corrosion and Electrode Potential
4. Polarization and Corrosion Rate
5. Passivity</td><td colspan="2">II. Examples of Corrosion
1. Stress Corrosion and Hydrogen embrittlement
2. Atmospheric Corrosion and Soil Corrosion
3. Oxidation Reactions
4. Stray Current Corrosion
5. Microbiologically Influenced Corrosion(MIC)
III. Prevention of Corrosion
1. Cathodic Protection
2. Coatings and Inhibitors
Material Selection and Design</td></tr>
<tr><td rowspan="2">課程目標
(course objectives)</td><td colspan="4">(中)
1.　了解腐蝕的基本原理
2.　了解腐蝕的型態與種類
3.　了解腐蝕的防制方法</td></tr>
<tr><td colspan="4">(Eng.)
1. To understand the basic principles of corrosion
2. To understand the forms and related mechanisms of corrosion
3. To understand the prevention methods of corrosion.</td></tr>
</table>

先修課程(prerequisites)

課程編碼 (course no.)	課程名稱 (course name)	與課程銜接的重要概念、原理與技能 (relation to the current course)

教學模式 (teaching methodology)	模式 (methodology)	講授 (teaching)	討論/報告 (discussion & report)	實驗/參訪 (exp./fab visit)	遠距/網路教學 (remote/web teaching)	合計 (sum)
	學分分配 (credit distrib.)	3				3
	授課時數分配 (hour distrib.)	3				3

授課進度與內容（週次、單元名稱與內容、習作/考試進度、備註）
(course content and homework/tests schedule)

週次 (week)	單元名稱與內容 (subject and content)	習作/考試進度 (homework and tests)	備註 (remark)
01	Overall Introduction	Ch1 1-3 exercises	
02	The Technology and Evaluation of Corrosion	Ch2 1-3 exercises	
03	Electrochemical Thermodynamic and Electrode Potential	Ch3 1-3 exercises	
04	Electrochemical Kinetic of Corrosion	Ch4 1-3 exercises	
05	Passivity	Ch5 1-3 exercises	
06	Polarization Method to Measure Corrosion Rate	Ch6 1-3 exercises	
07	Galvanic and Concentration Cell Corrosion	1-3 Reading related J. papers	
08	Pitting and Crevice Corrosion	3-5 Reading related J. papers	
09		Midterm Examination	
10	Environmentally Induced Cracking	Reading related J. papers	
11	Effects of Metallurgical Structure on Corrosion	Reading related J. papers	
12	Corrosion-Related Damage by Hydrogen, Erosion, and Wear	Reading related J. papers	
13	Corrosion in Selected Corrosive Environments	Reading related J. papers	
14	Atmospheric Corrosion and Elevated Temperature Oxidation	Reading related J. papers	
15	Cathodic Protection	Reading related J. papers	
16	Coatings and Inhibitors	Reading related J. papers	
17	Materials Selection and Design	Reading related J. papers	
18		Terminal Examination	

學習評量方式 **(evaluation)**
1. Midterm Examination: 50%(期中考試:習作佔 60%,其他內容佔 40%) 2. Terminal Examination: 50%(期末考試:習作佔 40%,其他內容佔 60%) Examination: 目的在評估學生對課堂講授內容的了解程度，並且培養同學平日課後複習的習慣以及思考問題的能力。
教科書（書名、作者、書局、代理商、說明） **(textbook)**
Principle and Prevention of Corrosion, Second Edition, Denny A. Jones,(1996),Prentice-Hall Inc.
參考書目（書名、作者、書局、代理商、說明 **(other references)**
Corrosion and Corrosion Control,3rd ed. Herbert H. Uhlig and R. Winston, 1985. John Wiley & Sons.
課程教材（教師個人網址請列在本校內之網址。） **(teaching aids & teacher's website)**
Power point files.

與學系教育目標之關聯性(材料系)
(relation to educational objective of materials engineering department)

1. 提供材料性質、製程與應用及跨領域知識與訓練
   To provide interdisciplinary know-how and training on materials properties, processing, and applications
2. 培育具獨立思考、創新與實作能力之材料科技人才
   To train materials technology students for independent thinking, innovation, and practical skills
3. 建立多元價值與國際觀
   To inculcate multifarious values and cosmopolitan worldview
4. 強化綠色材料科技教育
   To implement educational programs in eco-materials technology

與學系教育核心能力之關聯性(材料系)
(relation to educational core abilities for materials engineering department)

(A) 運用數學、科學及材料工程知識能力
Ability to apply knowledge of mathematics, science, and materials engineering
(B) 設計與執行材料實驗及分析數據之能力
Ability to design and conduct experiments, as well as analyze data
(C) 執行材料工程實務所需之技術與能力
Ability to use techniques and skills for materials engineering practices
(D) 製程整合及及元件實作之能力
Ability to integrate process and make devices
(E) 溝通協調之能力與團隊合作之精神
Ability to communicate effectively and cultivate the spirit of teamwork
(F) 獨立思考及解決問題之能力
Ability to think independently and solve problems
(G) 培養國際觀及認識綠色材料對全球環境的影響
Cultivation of cosmopolitan worldview and understanding effects of eco-materials on global environment
(H) 終身學習之習慣與能力
Ability to cultivate life-long learning habit
(I) 瞭解材料工程人員的社會責任與專業倫理
Understanding materials engineers' social responsibility and professional ethics

課程內涵達成學系【教育目標】比對資料

授課進度與內容	教育目標				
	目標一	目標二	目標三	目標四	目標五
	提供材料性質、製程與應用及跨領域知識與訓練	培育具獨立思考、創新與實作能力之材料科技人才	培養團隊合作精神與溝通協調整合能力	建立多元價值與國際觀	強調綠色材料科技教育
請勾選關聯性☑	☑	☑	☐	☑	☑
The Technology and Evaluation of Corrosion	0	1	0	0	0
Electrochemical Thermodynamic and Electrode Potential	0	1	0	0	0
Electrochemical Kinetic of Corrosion	0	1	0	0	0
Passivity	0	1	0	0	0
Polarization Method to Measure Corrosion Rate	1	1	0	0	0
Galvanic and Concentration Cell Corrosion	1	1	0	0	0
Pitting and Crevice Corrosion	1	1	0	0	0
Environmentally Induced Cracking	1	1	0	0	0
Effects of Metallurgical Structure on Corrosion	1	1	0	0	0
Corrosion-Related Damage by Hydrogen, Erosion, and Wear	1	1	0	0	0
Corrosion in Selected Corrosive Environments	1	1	0	0	0
Atmospheric Corrosion and Elevated Temperature Oxidation	1	1	0	0	0
Cathodic Protection	1	1	0	0	0
Coatings and Inhibitors	1	1	0	0	0
Materials Selection and Design	1	1	0	1	1
總計(%)	73(%)	100(%)	0(%)	0(%)	6(%)

註：
1. 所有必修課均須填寫此表。
2. 矩陣中請填入關聯性； 1 表示相關，0 表示無相關。
3. 學系教育目標項次請依據表1填寫。

課程內涵達成學系【核心能力】比對資料(大學部)

授課進度與內容	核心能力								
	A	B	C	D	E	F	G	H	I
	運用數學、科學及材料工程知識能力	設計與執行材料實驗及分析數據之能力	執行材料工程所需技術之實務與能力	整合及製程及件之實能作力	溝通協調之能力與團隊合作之精神	獨立思考及解決問題之能力	培養國際觀及認識綠色材料對全球環境的影響	終身學習之習慣與能力	瞭解材料工程人員的社會責任與專業倫理
請勾選關聯性☑	☑	☑	☑	☑	☐	☑	☑	☐	☐
The Technology and Evaluation of Corrosion	1	0	0	0	0	0	0	0	0
Electrochemical Thermodynamic and Electrode Potential	1	0	0	0	0	0	0	0	0
Electrochemical Kinetic of Corrosion	1	0	0	0	0	0	0	0	0
Passivity	1	0	0	0	0	0	0	0	0
Polarization Method to Measure Corrosion Rate	0	1	1	0	0	0	0	0	0
Galvanic and Concentration Cell Corrosion	0	1	1	0	0	0	0	0	0
Pitting and Crevice Corrosion	0	1	1	0	0	0	0	0	0
Environmentally Induced Cracking	0	1	1	0	0	0	0	0	0
Effects of Metallurgical Structure on Corrosion	0	1	1	0	0	0	0	0	0
Corrosion-Related Damage by Hydrogen, Erosion, and Wear	0	1	1	0	0	0	0	0	0
Corrosion in Selected Corrosive Environments	0	1	1	0	0	0	0	0	0
Atmospheric Corrosion and Elevated Temperature Oxidation	0	1	1	0	0	0	0	0	0
Cathodic Protection	0	0	1	1	0	0	0	0	0
Coatings and Inhibitors	0	0	1	1	0	0	0	0	0
Materials Selection and Design	0	0	0	0	0	1	1	0	0
總計(%)	26%	53%	66%	13%	0%	6%	6%	0%	%

註：
1. 所有必修課均須填寫此表。
2. 矩陣中請填入關聯性； 1 表示相關，0 表示無相關。
3. 學系教育目標項次請依據表1填寫。