City University of Hong Kong
Course Syllabus

offered by Department of Physics
with effect from Semester B 2017/18

Part I Course Overview

Course Title:	**Corrosion and Surface Engineering**
Course Code:	**AP6303**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**P6**
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**Nil**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**AP8170 Environmental Degradation** **AP8303 Corrosion and Surface Engineering**

Part II Course Details

1. Abstract

To provide fundamental and practical understanding of corrosion behavior of metallic materials and surface engineering.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Describe the basis of electrochemistry, passivation and corrosion rates.		√		
2.	Contrast the basis of various forms of corrosion, breakdown of passivation and materials selection.			√	√
3.	Carry out standard corrosion test and interpret the test data.		√	√	
4.	Innovatively apply the various surface engineering techniques.		√	√	
		100%			

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Lecture	Explain principles of electrochemistry and kinetics	√						12 hrs
Lecture and tutorial	Mechanisms of various corrosion attacks, material selection		√					10 hrs
Laboratory	Polarization test and corrosion rate measurements	√	√					3 hrs
Lecture and group discussion	Discuss the proper use of coatings for the protection of metals against corrosion				√			9 hrs
								total: 39 hrs

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4				
Continuous Assessment: 40 %								
Coursework assignments	√	√		√			20%	
Writing laboratory report and analysis of experimental data	√	√	√				20%	
Examination: 60% (duration: 2 hours)								
							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Coursework assignments	Understanding fundamentals of electrochemistry, corrosion, materials selection and coatings for corrosion protection	High	Significant	Moderate	Basic	Not even reaching marginal levels
2.Laboratory report	Ability to perform experiment and analyse the data	High	Significant	Moderate	Basic	Not even reaching marginal levels
3.Final examination	Ability to explain and analyse various corrosion mechanisms and capability of selecting materials against corrosion	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

- Overview of electrode potential
- Nernst equation, Pourbaix diagram
- Anodic and cathodic protection
- Electrode kinetics, passivation, forms of corrosion
- Materials selection
- Plasma spraying
- Laser alloying
- Ion implantation

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Corrosion Engineering, by Mars G Fontana, McGraw -Hill (1986)
2.	Principles and Prevention of Corrosion, by Denny A Jones, MacMillan Publishing Company (1996)

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

Nil