

# TEMPLATE FOR COURSE SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Chemical Engineering Department
3. Course title/code	Corrosion Engineering\447
4. Programme(s) to which it contributes	CE.447
5. Modes of Attendance offered	Full
6. Semester/Year	1 semester/year
7. Number of hours tuition (total)	3
8. Date of production/revision of this Specification	25/5/2015
9. Aims of the Course	
1. To introduce and develop and understanding the material that are precious resources, how these resources are destroyed by corrosion and how they must be preserved by applying corrosion protection technology .	
2. Inspect the corrosion process, and the form of corrosion.	
3. Determine the corrosion rate , and electrochemical behavior of the metals.	
4. Applying the corrosion prevention technology.	

<b>10• Learning Outcomes, Teaching, Learning and Assessment Method</b>
<b>A-Knowledge and Understanding</b> A1. Develop a deep understanding of issues related to the corrosion science and electrochemistry. A2. Ability to predict the form of corrosion. A3.. Ability to apply corrosion prevention
<b>B. Subject-specific skills</b> B1. Analyze and interpret the data from electrochemical behavior of the metal to determine the corrosion rate B2. Ability to relate the different methods of corrosion rate prediction to each other. B3. Apply the corrosion reaction to determine other topics relating to chemical engineering such as mass transfer coefficient ,thickness of boundary layer .....etc..
<b>Teaching and Learning Methods</b>
Lectures, Tutorials ,Example Classes , Homework, Problems, Reports.
<b>Assessment methods</b>
Midterm exams , Final exam , Quizzes.
<b>C. Thinking Skills</b> C1. An ability to material selection . C2. Solve corrosion problem immediately. C3. Apply a design role in corrosion prevention methods. C4. Characterization and analyses the performance of chemical engineering equipment and plants economically and relating it to the environment and safety.
<b>Teaching and Learning Methods</b>
Lectures, Tutorials , Example Classes , homework, problem ,reports.
<b>Assessment methods</b>
Midterm exams , Final exam , Quizzes.

## D. General and Transferable Skills (other skills relevant to employability and personal development).

D1. Work together as a group to prepare reports and/or case study.

D2. The use of new technological tools (such as laser) for solving problem.

D3. Evaluate the information and ideas in the handling of corrosion issues

## 11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
<b>2<sup>nd</sup> semester</b>					
1	3	To introduce, develop and understanding the material that are precious resources and how these resources are destroyed by corrosion	Introduction, definition, corrosive environment, consequence of corrosion, cost of corrosion, why metals corrode, basic concept in corrosion	Lectures, case study	Oral questions, discussion
2	3	Ability to understand types of corrosion and forms of corrosion	Classification of corrosion, anodic and cathodic reactions, type of cells, wet corrosion, dry corrosion.	Lectures, case study	Oral questions, discussion
3	3	Ability to understand types of corrosion and forms of corrosion	Forms of corrosion	Lectures, case study	Quiz
4	3	Ability to correlate between electrochemistry (Faraday's law) and corrosion	Kinetics of aqueous corrosion	Lectures, Examples, Tutorials	Oral questions, discussion
5	3	Ability to correlate between electrochemistry (Faraday's law) and corrosion	Current density, polarization, activation, concentration and combined polarization	Lectures	Oral questions, discussion
6	3	Ability to correlate free energy and corrosion	Thermodynamics, free energy, cell potential, reversible electrode potential, Nernst equation	Lectures, Examples, Tutorial	Quiz.
7		Ability to calculate the corrosion rate	Determining the corrosion rate, corrosion rate measurement unit, methods determining corrosion rate (immersion test)	Lectures, Examples, Tutorial	Oral questions, discussion

8	3	Ability to calculate the corrosion rate	Electrochemical technique ,Tafel extrapolation ,Linear polarization	Lectures,Example s,Tetural	Quize.
9	3	Ability to distinguish between electrtochemicalbeh avior of metals	Passivity,active passive metal ,condision for passivity ,kinetics for passivity ,stable and unstable passivity	Lectures,Example s,Practical application	Oral questions,discussion
10	3	Ability to relating different type of standered electrode	Reference electrodes,hydrogenelectrode, Ag\Agcl, Cu\CuSO4,Zn\ZnCl2 Pb\PbCl2 electrode	Lectures,Example s,tutorial	Oral questions,discussion
11	3	Ability tothinking of different methods for corrosion prevention	Corrosion prevention,materialselection,alt s,practical application of environment ,design ,coating .	Lectures,Example s,practical application	Oral questions,discussion
12	3	Ability to thinking of different methods for corrosion prevention	Cathodic and Anodic protection	Lectures,Example s,practical application	Oral questions,discussion
13	3	Ability to thinking of different methods for corrosion prevention	Corrosion control by inhibition ,important consideration in selection of inhibitor ,classification of inhibitor,description of inhibitors	Lectures,Example s,practical application	Oral questions,discussion
14	3	Ability to thinking of different methods for corrosion prevention	Effect of inhibitor on polarization behavior ,calculation of inhibitor concentration ,inhibitor effeciency	Lectures,Example s,practical application	Oral questions,discussion
15	3	Ability to thinking of efficient boiler requirment	Boiler corrosion ,major corrosion problem in boilers .	Lectures,Example s,practical application	Quize

12.Infrastructure	
Requiredreading: ·CORETEXTS ·COURSEMATERIALS ·OTHER	<ul style="list-style-type: none"> <li>○ Lecturers</li> <li>○ M.G.FONTANA and N.D.GREENE,CORROSION ENGINEERING ,3<sup>rd</sup>Edition,McGRAW-HILL BOOK COMPANY 1986</li> <li>○ ZAKI AHMAD, PRINCIPLES OF CORROSION ENGINEERING AND CORROSION CONTROL,1<sup>ST</sup> ,IChem<sup>E</sup>,2006</li> </ul>

Special requirements (include for example workshops, periodicals, IT software, websites)	websites
Community-based facilities (include for example, guest Lectures, internship, field)	field trips

13. Admissions	
Pre-requisites	Before undertaking this module the student should have undertaken the following: Basic Principles of chemical engineering I and II, chemistry, mathematics I and II, Physical chemistry, as well simultaneous courses: - Thermodynamics, material science and reaction kinetics.
Minimum number of students	Central admission
Maximum number of students	Central admission