Unit Outline
CHEM5002 Corrosion and Corrosion Prevention in Liquids
Semester 2, 2016

Unit study package code: CHEM5002
Mode of study: Fully Online
Tuition pattern summary: This unit does not have a fieldwork component.
Credit Value: 25.0
Pre-requisite units:
313629 (v.1) Corrosion Chemistry 500
OR
313983 (v.0) Corrosion Chemistry 500 or any previous version
OR
CHEM5003 (v.0) Corrosion Chemistry or any previous version

Co-requisite units: Nil
Anti-requisite units: Nil
Result type: Grade/Mark
Approved incidental fees: Information about approved incidental fees can be obtained from our website. Visit fees.curtin.edu.au/incidental_fees.cfm for details.

Unit coordinator:
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Consultation times: with appointment only

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Learning Management System: Blackboard (lms.curtin.edu.au)

Acknowledgement of Country
We respectfully acknowledge the Indigenous Elders, custodians, their descendants and kin of this land past and present.
Syllabus
The unit focuses on the monitoring techniques and mitigation strategies required to assess corrosion in liquid environments with particular focus on oil & gas flowline, and develop and manage corrosion control programs. A deep understanding of the corrosion environment in liquid environments, oxygen and carbonic acid corrosion, corrosion cells and reactions, electrochemical theories and methods, O2, CO2 and H2S corrosion mechanisms, kinetics, product scale and its effects will be provided. Flow regimes in pipelines, corrosion types for different operating phases, predictive modelling, identification, detection and corrosion measurement, resistant alloys, inhibitors, intelligent pigging and monitoring devices. Topics covered in detail are: Top of the line corrosion, under-deposit corrosion, developing technologies, and improved maintenance plans to minimise corrosion as well as data interpretation, analysis and integration, as well as criteria for determining corrective action for high-level corrosion problems within a liquid corrosion system.

Introduction
This unit is designed for students enrolled in Graduate Certificate in Corrosion Engineering course. This knowledge is important for engineers and scientists who seek to achieve a deep understanding of metal corrosion and its prevention in liquid environments. The unit is divided into 4 modules:

1. Module A: Liquid Corrosion Environment and Reactions
2. Module B: Corrosion Mechanisms and Patterns
3. Module C: Monitoring and Prevention of Liquid Corrosion
4. Module D: Develop and Manage Corrosion Control Programs

Module A) will discuss corrosion environments in liquids, such as CO2 corrosion, oxygen corrosion, etc. In Module B, we will focus on the respective corrosion mechanisms and resulting forms of corrosion, before we investigate suitable methods for corrosion monitoring and explore corrosion prevention strategies in Module C. We tie up the learning outcomes by applying the newfound knowledge to discuss corrosion control programs in the last module (D).

Unit Learning Outcomes
All graduates of Curtin University achieve a set of nine graduate attributes during their course of study. These tell an employer that, through your studies, you have acquired discipline knowledge and a range of other skills and attributes which employers say would be useful in a professional setting. Each unit in your course addresses the graduate attributes through a clearly identified set of learning outcomes. They form a vital part in the process referred to as assurance of learning. The learning outcomes tell you what you are expected to know, understand or be able to do in order to be successful in this unit. Each assessment for this unit is carefully designed to test your achievement of one or more of the unit learning outcomes. On successfully completing all of the assessments you will have achieved all of these learning outcomes.

Your course has been designed so that on graduating we can say you will have achieved all of Curtin’s Graduate Attributes through the assurance of learning process in each unit.

<table>
<thead>
<tr>
<th>On successful completion of this unit students can:</th>
<th>Graduate Attributes addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Describe practical corrosion issues in liquid environments</td>
<td><img src="image" alt="Email" /> <img src="image" alt="Chat" /> <img src="image" alt="Social" /></td>
</tr>
<tr>
<td>2 Explain fundamental principles and concepts involved in liquid corrosion</td>
<td><img src="image" alt="Email" /> <img src="image" alt="Chat" /> <img src="image" alt="Social" /></td>
</tr>
<tr>
<td>3 Apply the fundamentals of corrosion theory to explain corrosion failures in liquid environments and prevention strategies</td>
<td><img src="image" alt="Email" /> <img src="image" alt="Chat" /> <img src="image" alt="Social" /> <img src="image" alt="File" /></td>
</tr>
<tr>
<td>4 Critically evaluate data to determine the cause of corrosion in liquids and optimum solutions for corrosion control</td>
<td><img src="image" alt="Email" /> <img src="image" alt="Chat" /> <img src="image" alt="Social" /> <img src="image" alt="File" /></td>
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</tbody>
</table>
Learning Activities

Lectures 12 online lectures (iLectures) are provided weekly according to the academic calendar (no lectures during tuition free weeks, see attached schedule). Lectures provide the fundamental basis of your knowledge in this unit. Lectures will give you guidance on the topics covered and provide you with examples of application of the theory. Additional reading/learning materials will be provided in the lectures for you to deepen your understanding of the topic covered. It is expected of you that you spend at 3 hours per week on the iLectures provided. (See tuition pattern) For the second time this semester, we will be offering short "check your knowledge tests" for each teaching week. These tests are not marked, they are there for you to see if you have understood the knowledge that was offered in the iLectures. Tutorials The tutorial program comprises weekly online tutorials (commencing week 2). Your tutorial exercises are provided fortnightly according to the attached schedule. The topics and assigned activities for the tutorial sessions will be posted on FLECS-Blackboard the week before the tutorial. We will be using Blackboard Collaborate to allow for teacher - student contact, as well as student - student contact. The first on-line tutorial will be held in teaching week 2. It is expected of you that you completed the iLectures for each teaching week prior the tutorial. The tutorials will cover case-studies and will build on the iLectures. These tutorials are not a repeat of what is covered in the iLectures. Online quizzes The online quizzes are a continuous learning process in which you will complete short online quizzes throughout the semester and gain immediate feedback on your progress. The quizzes will be available for at least two weeks from the release date and must be completed within this period. No extensions will be offered. Students who require assistance with or feedback on particular questions should raise this during the following tutorial session for discussion. These quizzes contribute each 5% to your final mark/grade.

Learning Resources

Online resources

- All essential materials are available through Curtin’s library as on-line texts. There is no need to buy any text books. The links to the relevant materials will be published in the iLectures and and Reading Materials content folder on Blackboard. ([http://library.curtin.edu.au/](http://library.curtin.edu.au/))

Other resources

10. Corrosion engineering handbook. Fundamentals of metallic corrosion atmospheric and media corrosion of

Assessment
Assessment schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>Value %</th>
<th>Date Due</th>
<th>Unit Learning Outcome(s) Assessed</th>
</tr>
</thead>
</table>
| On-line quizzes           | 20 percent | Week: End of teaching week 3, 6, 9, 12  
                          |         | Day: Sunday  
                          |         | Time: 23:59  | 1,2 |
| Assignment                | 30 percent | Week: End of weeks 7 and 13  
                          |         | Day: Sunday  
                          |         | Time: 23:59  | 3,4 |
| Final Examination         | 50 percent | Week: sometimes between 14 to 26 November  
                          |         | Day: tba  
                          |         | Time: tba  | 1,2,3,4 |

Detailed information on assessment tasks

1. These are online quizzes that will help you to check your understanding of the learning materials delivered in each teaching module. If you don’t do very well in these tests - you should fill the gaps in your knowledge. The unit is designed that the knowledge from module 1 is required to understand module 2, and so on.

2. You are asked to write two assignments. Assignment 1 will be about applying the knowledge learnt in modules 1 and 2, assignment 2 about modules 3 and 4. The assignments will be ca. 1500 words in lengths. Make sure that you understand Curtin’s rules on plagiarism and follow the marking guides published with the assignments.

3. Final Examination. It counts for 50% of your marks. Please note that the date and place of the examinations will be communicated to you through OCC later in the semester. If you are not in Perth, please contact at that time the Examination Office so that your examination paper can be sent to a test centre near you. Thanks!

Pass requirements

Students must pass all assessments

Late submissions will result in a penalty, unless otherwise agreed prior to the deadline.

Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that student work is evaluated consistently by assessors. Minimum standards for the moderation of assessment are described in the Assessment and Student Progression Manual, available from policies.curtin.edu.au/policies/teachingandlearning.cfm
Late assessment policy
This ensures that the requirements for submission of assignments and other work to be assessed are fair, transparent, equitable, and that penalties are consistently applied.

1. All assessments students are required to submit will have a due date and time specified on this Unit Outline.
2. Students will be penalised by a deduction of ten percent per calendar day for a late assessment submission (eg a mark equivalent to 10% of the total allocated for the assessment will be deducted from the marked value for every day that the assessment is late). This means that an assessment worth 20 marks will have two marks deducted per calendar day late. Hence if it was handed in three calendar days late and given a mark of 16/20, the student would receive 10/20. An assessment more than seven calendar days overdue will not be marked and will receive a mark of 0.

Assessment extension
A student unable to complete an assessment task by/on the original published date/time (eg examinations, tests) or due date/time (eg assignments) must apply for an assessment extension using the Assessment Extension form (available from the Forms page at students.curtin.edu.au/administration/) as prescribed by the Academic Registrar. It is the responsibility of the student to demonstrate and provide evidence for exceptional circumstances beyond the student’s control that prevent them from completing/submitting the assessment task.

The student will be expected to lodge the form and supporting documentation with the unit coordinator before the assessment date/time or due date/time. An application may be accepted up to five working days after the date or due date of the assessment task where the student is able to provide an acceptable explanation as to why he or she was not able to submit the application prior to the assessment date. An application for an assessment extension will not be accepted after the date of the Board of Examiners’ meeting.

Deferred assessments
If your results show that you have been granted a deferred assessment you should immediately check OASIS for details.

Deferred examinations/tests will be held from 15/02/2017 to 17/02/2017. Notification to students will be made after the Board of Examiners’ meeting via the Official Communications Channel (OCC) in OASIS.

Supplementary assessments
Supplementary assessments are not available in this unit.

Reasonable adjustments for students with disabilities/health circumstances likely to impact on studies
A Curtin Access Plan (CAP) is a document that outlines the type and level of support required by a student with a disability or health condition to have equitable access to their studies at Curtin. This support can include alternative exam or test arrangements, study materials in accessible formats, access to Curtin’s facilities and services or other support as discussed with an advisor from Disability Services (disability.curtin.edu.au). Documentation is required from your treating Health Professional to confirm your health circumstances.

If you think you may be eligible for a CAP, please contact Disability Services. If you already have a CAP please provide it to the Unit Coordinator at the beginning of each semester.

Referencing style
The referencing style for this unit is Chicago.

More information can be found on this style from the Library web site: http://libguides.library.curtin.edu.au/referencing.
Copyright

© Curtin University. The course material for this unit is provided to you for your own research and study only. It is subject to copyright. It is a copyright infringement to make this material available on third party websites.

Academic Integrity (including plagiarism and cheating)

Any conduct by a student that is dishonest or unfair in connection with any academic work is considered to be academic misconduct. Plagiarism and cheating are serious offences that will be investigated and may result in penalties such as reduced or zero grades, annulled units or even termination from the course.

Plagiarism occurs when work or property of another person is presented as one’s own, without appropriate acknowledgement or referencing. Submitting work which has been produced by someone else (e.g. allowing or contracting another person to do the work for which you claim authorship) is also plagiarism. Submitted work is subjected to a plagiarism detection process, which may include the use of text matching systems or interviews with students to determine authorship.

Cheating includes (but is not limited to) asking or paying someone to complete an assessment task for you or any use of unauthorised materials or assistance during an examination or test.

From Semester 1, 2016, all incoming coursework students are required to complete Curtin’s Academic Integrity Program (AIP). If a student does not pass the program by the end of their first study period of enrolment at Curtin, their marks will be withheld until they pass. More information about the AIP can be found at: https://academicintegrity.curtin.edu.au/students/AIP.cfm

Refer to the Academic Integrity tab in Blackboard or academicintegrity.curtin.edu.au for more information, including student guidelines for avoiding plagiarism.

Information and Communications Technology (ICT) Expectations

Curtin students are expected to have reliable internet access in order to connect to OASIS email and learning systems such as Blackboard and Library Services.

You may also require a computer or mobile device for preparing and submitting your work.

Since this is a fully on-line unit, your internet access should be fast enough that you can stream videos. It is possible to download media from Blackboard but that requires a reliable and stable internet connection.

For on-line tutorials, a webcam and headset is recommended. This also comes handy if you want to learn in groups. There is an on-line meeting room available for you 24/7, which has a sharable whiteboard and you can even share your screens to each other.

For general ICT assistance, in the first instance please contact OASIS Student Support: oasisapps.curtin.edu.au/help/general/support.cfm

For specific assistance with any of the items listed below, please contact The Learning Centre: life.curtin.edu.au/learning-support/learning_centre.htm

- Using Blackboard, the I Drive and Back-Up files
- Introduction to PowerPoint, Word and Excel

Additional information

As you know, this unit is fully online. We will meet face-to-face via BlackBoard Collaborate, but this unit will require self-discipline and steady learning. Start early and keep up-to-date with lectures and the tutorial questions, so that you can make the best use of the tutorials and ask your lecturers questions.

Enrolment

It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.
Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- the University’s Guiding Ethical Principles
- the University’s policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University’s policies on appropriate use of software and computer facilities

Information on all these things is available through the University’s “Student Rights and Responsibilities” website at: students.curtin.edu.au/rights.

Student Equity

There are a number of factors that might disadvantage some students from participating in their studies or assessments to the best of their ability, under standard conditions. These factors may include a disability or medical condition (e.g. mental illness, chronic illness, physical or sensory disability, learning disability), significant family responsibilities, pregnancy, religious practices, living in a remote location or another reason. If you believe you may be unfairly disadvantaged on these or other grounds please contact Student Equity at eesi@curtin.edu.au or go to http://eesi.curtin.edu.au/student_equity/index.cfm for more information.

You can also contact Counselling and Disability services: http://www.disability.curtin.edu.au or the Multi-faith services: http://life.curtin.edu.au/health-and-wellbeing/about_multifaith_services.htm for further information.

It is important to note that the staff of the university may not be able to meet your needs if they are not informed of your individual circumstances so please get in touch with the appropriate service if you require assistance. For general wellbeing concerns or advice please contact Curtin’s Student Wellbeing Advisory Service at: http://life.curtin.edu.au/health-and-wellbeing/student_wellbeing_service.htm

Recent unit changes

Students are encouraged to provide unit feedback through eVALUate, Curtin’s online student feedback system. For more information about eVALUate, please refer to evaluate.curtin.edu.au/info/.

To view previous student feedback about this unit, search for the Unit Summary Report at https://evaluate.curtin.edu.au/student/unit_search.cfm. See https://evaluate.curtin.edu.au/info/dates.cfm to find out when you can eVALUate this unit.

Recent changes to this unit include:

We updated and improved a number of materials, self-tests and quizzes. We hope that you will like the materials. Please provide us with feedback - good or bad - without it we can’t make things better. Don’t wait with feedback until the end of the semester, the sooner you let us know, the sooner we can fix it and help you understanding “Corrosion in Liquids”.
# Program calendar

## Program Calendar – Semester 2 2016

<table>
<thead>
<tr>
<th>Week</th>
<th>Begin Date</th>
<th>Quiz</th>
<th>Assignment</th>
<th>On-line tutorials</th>
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</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>25 July</td>
<td></td>
<td>Orientation Week</td>
<td></td>
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<tr>
<td>1.</td>
<td>1 August</td>
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<td>2.</td>
<td>8 August</td>
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<td>X</td>
<td>x</td>
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<tr>
<td>3.</td>
<td>15 August</td>
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<td>x</td>
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<td>4.</td>
<td>22 August</td>
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<td>x</td>
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<td>5.</td>
<td>29 August</td>
<td></td>
<td>Tuition Free Week</td>
<td>x</td>
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<td>6.</td>
<td>5 September</td>
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<td>x</td>
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<tr>
<td>7.</td>
<td>12 September</td>
<td>X</td>
<td>X</td>
<td>x</td>
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<tr>
<td>8.</td>
<td>19 September</td>
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<td></td>
<td>x</td>
</tr>
<tr>
<td>9.</td>
<td>26 September</td>
<td></td>
<td>Tuition Free Week</td>
<td>x</td>
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<tr>
<td>10.</td>
<td>3 October</td>
<td></td>
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<td>x</td>
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<tr>
<td>11.</td>
<td>10 October</td>
<td>X</td>
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<td>x</td>
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<tr>
<td>12.</td>
<td>17 October</td>
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<td>x</td>
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<tr>
<td>13.</td>
<td>24 October</td>
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<td>x</td>
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<tr>
<td>14.</td>
<td>31 October</td>
<td>X</td>
<td>X</td>
<td>x</td>
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<tr>
<td>15.</td>
<td>7 November</td>
<td></td>
<td>Study Week</td>
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<tr>
<td>16.</td>
<td>14 November</td>
<td></td>
<td>Examinations</td>
<td></td>
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<tr>
<td>17.</td>
<td>21 November</td>
<td></td>
<td>Examinations</td>
<td></td>
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