

MODULE DESCRIPTION FORM



DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CL218 and CHEMISTRY AND MATERIALS SCIENCE

Module Registrar: Prof. Vernon Phoenix	Taught To: BEng/MEng Civil Engineering, Civil & Environmental Engineering		
Other Lecturers Involved: Dr Andrea Hamilton, Dr Erin Corbett	Credit Weighting: 20	Semester: 1 and 2	
Assumed Prerequisites: none	Compulsory	Academic Level: 2	Suitable for Exchange: Y

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	Total
20	20	6	24		30	0		100	200

Educational Aim

This class aims to provide practical insights to fundamental chemistry and materials science and their roles in a wide range of civil and environmental engineering applications.

Learning Outcomes

On completion of the module the student is expected to be able to

- LO1 demonstrate a working knowledge of fundamental principles of chemistry and materials science.
- LO2 identify aspects of chemistry and materials science that link to the engineering properties and behaviour of materials.
- LO3 apply fundamentals of chemistry and materials science to solve engineering problems.

Syllabus

The module will include the following:

Chemistry Material properties, use of the periodic table; chemical formulas, chemical reaction equations; bonding; equilibrium chemistry and the concept of pH; electronegativity and redox chemistry; free radical chemistry

Chemical Thermodynamics Laws of Thermodynamics (First Principles); chemical equilibrium; gas behaviour (ideal gas law); effects of temperature and pressure; phase changes; reactivity and activation energy

Materials Science Mineralogy; Crystallinity, defects, and impacts on material properties; Structural materials (e.g. steel, concrete, glass, polymers, etc); Geomaterials (e.g. rocks, soils and its constituent, etc);

Integration Applications Cement; Corrosion; Chemistry of the environment (pollution-environment interactions and remediation) and specific cycles/systems; Pollution and its impacts on development; Public health issues

Assessment of Learning Outcomes

Criteria

For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1 demonstrate a working knowledge of fundamental principles of chemistry and materials science.

C1 understand concepts from chemistry and materials science relevant to civil and environmental engineering

C2 link fundamental phenomena of chemistry and materials science to complex phenomena.

C3 apply theoretical principles of chemistry and materials science to complex, open-ended problems in civil and environmental engineering.

LO2 identify aspects of chemistry and materials science that link to the engineering properties and behaviour of materials.

C1 develop a working knowledge of how basic principles affect complex engineering phenomena

C2 link complex engineering behaviour to fundamental science

C3 demonstrate this knowledge in the application of appropriate tests to engineering materials

LO3 apply fundamentals of chemistry and materials science to solve engineering problems.

C1 identify materials of interest to civil and environmental engineering and their fundamental physical properties

C2 determine the key aspects of fundamental chemistry and materials science that affect these materials

C3 apply this knowledge to explain how these materials are manufactured (including historic technologies) and manipulated by their environment.

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback

(within Assessment and Feedback Policy at: <https://www.strath.ac.uk/staff/policies/academic/>)

1. A range of assessment activities are used including tutorial work, quizzes, laboratory testing and reporting. Expectations in terms of time and effort are outlined clearly in the presentation of each assignment.
2. All assessments are clearly related to the learning outcomes and assessment feedback is provided against clearly stated criteria.
3. Assessments and methods are clearly explained to students at the start of the course.
4. The effectiveness of the assessment and feedback methods are reviewed at the end of the course and any recommended changes are implemented in the next academic year

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

	Examinations			Courseworks		Projects		
	Number	Month(s)	Duration	Weighting	Number	Weighting	Number	Weighting
	2	December, May	2 hrs	52%	28	48%		
L/Outcomes	L01, L02, L03							

Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines (*academic weeks*):

Resit Assessment Procedures:

Resubmission of coursework(s) prior to commencement of the August exam diet.

PLEASE NOTE:

Students must gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be resubmit coursework. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

*****Purchase recommended **Highly recommended reading *For reference**

***Dean, John R., Alan M. Jones, David Holmes, Rob Reed, Jonathan Weyers, and Allan Jones (2011) Practical Skills in Chemistry, Second Edition [online] Available at <http://www.dawsonera.com/depp/reader/protected/external/AbstractView/S9780273731191> [free access via Suprimo]**

****Moore, John T. (2004) Chemistry Made Simple. New York: Broadway Books.**

***Roussak, O.V. and H. D. Gesser (2013) Applied Chemistry: A Textbook for Engineers and Technologists [online] Available at <http://link.springer.com/book/10.1007/978-1-4614-4262-2/page/1> [free access via Suprimo]**

***Sawyer, Clair N., Perry L. McCarty, and Gene F. Parkin (2002) Chemistry for Environmental Engineering and Science, Fifth Edition. London: McGraw-Hill Inc.**

*****Callister, W. D. and David G. Rethwisch (2009) Materials Science and Engineering: An Introduction, 10th edition. Wiley.**

Additional Student Feedback

(Please specify details of when additional feedback will be provided)

Date	Time	Room No

Session: Additional feedback will be provided whenever needed and appropriate for the students learning

Approved:

Course Director Signature:
Date of Last Modifications: 29/08/22

MODULE TIMETABLE

Module Code: CL218

Module Title: Chemistry and Materials Science

Brief Description of Assessment:

Assessment for this 20 credit course includes 2 exams (sem 1 and sem 2), weekly mini-quizzes (sem1), weekly online quizzes (sem2). The lab class is split into 2 to accommodate class size but students attend the lab class once each, not on both weeks.

Assessment breakdown: **Each semester is worth 50% of the total CL218 grade.**

Semester 1: Exam (26%), weekly mini-quizzes, except week 2 (24%)

Semester 2: Exam (26%), weekly quizzes (18%), group lab report (6%).

Assessment Timing:-

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam. Use the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.

Please note: Timings can and will change, this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
	Choose an item. Choose an item.	Course work Submit Choose an item.	Choose an item. Choose an item.	Course work Submit Choose an item.	Course work Submit Choose an item.	Course work Submit Choose an item.	Course work Submit Choose an item.	Course work Submit Choose an item.	Course work Submit Choose an item.	Course work Submit Choose an item.

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
	Choose an item. Choose an item.	Online Test Choose an item.	Online Test Lab	Online Test Lab						

