

MODULE DESCRIPTOR 2019/20

CL990 Environmental Geochemistry

Registrar: Prof Robert M Kalin	Taught To (Programme): MSc	
Other Lecturers Involved: Dr Christopher Gallacher	Credit Weighting: 10	Semester: 1/2/3
Assumed Pre-requisites:	Compulsory/ optional/ elective class	Academic Level: 5

Class Format and Delivery (hours):

Lecture	Tutorial	Laboratory	Coursework	Project	Private Study	Total
35	5		30		30	100

Class Aim(s)

This class aims to:

- Explore the controls of chemical composition of water resulting from geochemical reactions in nature
- Develop an understanding of geochemical thermodynamics, including:
 - Determination of Water-Rock thermodynamics
 - Buffered systems such as carbonate geochemistry
 - Aqueous Speciation and Complexation
 - Geochemical Modelling
- Develop and understanding of weathering, including:
 - Congruent geochemical reactions and dissolved salts
 - Incongruent geochemical reactions and clay formations
 - Redox geochemical reactions
 - Natural and man-made organic chemicals
 - Earth Science Systems

Learning Outcomes

On completion of the class the student is expected to be able to:

LO1 Outline the significance of natural geochemical reactions and their control of the chemical composition of natural surface-waters and ground-waters.

LO2 Undertake a range of calculations and modelling that predict the sources of dissolved chemical constituents in natural waters.

Syllabus

The class will teach the following:

General Chemical Terms and Analysis Methods
Rainwater, Surface water, Groundwater geochemistry
Chemical Thermodynamic Controls on water chemistry
Carbonate and Silicate Geochemical reactions
Redox Chemical reactions
Surface Chemistry, congruent and incongruent reactions
Metals and organic compounds in water
Organic Geochemistry

Assessment Criteria

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

LO1 Outline the significance of natural geochemical reactions and their control of the chemical composition of natural surface-waters and ground-waters.

- C1 Natural Water analysis and chemical controls on water quality
- C2 Carbonate and Silicate Geochemical reactions
- C3 Ability to perform thermodynamic and redox chemical balance calculations
- C4 Detail sources of natural water chemical variation

LO2 Undertake a range of calculations and modelling that predict the sources of dissolved chemical constituents in natural waters.

- C1 Ability to model the changes in water chemistry
- C2 The ability to review, adjust and analyse natural reactions that control water chemistry
- C3 The ability to predict chemical reactions that influence degradation of organics in natural waters
- C4 The ability to solve questions of water quality within an earth system science framework.

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

Principles of Assessment and Feedback (<https://www.strath.ac.uk/staff/policies/academic/>)

Please state briefly how these are incorporated in this module.

1. All assignments and assessments combine straightforward and challenging tasks. Assessment criteria are set clearly in advance, as are marking rubrics and resources.
2. All assessed coursework assignments are returned to students with feedback including annotations and comments. Model solutions are provided for some coursework assignments. Opportunity for one-to-one interaction between instructors and students and timely feedback will be made at least every two weeks but is planned on a weekly basis. Online forums and discussion environments will be used and participation encouraged for peer learning on problems.

Recommended Reading

Various Geochemical Papers and Materials on MyPlace

PLEASE NOTE:

Students need to gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of exam / coursework.

Resit Arrangements

Will be made on a case by case basis

Approved

Programme Director Signature:

Date of Last Modifications: 14/09/19

