



Module Descriptor Form

Civil and Environmental Engineering

CL520 - Engineering Challenges In Nuclear Decommissioning

Module Code	CL520	Module Title	Engineering Challenges In Nuclear Decommissioning				
Module Registrar	Renshaw, Dr Joanna C						
Other Staff Involved							
Credit Weighting	10	Semester	2	Elective	No	Academic Level	5
Pre-requisites							
Required for							

Module Format and Delivery (hours):

Lectures	Tutorials	Assignments	Labs	Private Study	Total
20	0	0	0	80	100

Educational Aim

This module aims to:

This module aims to provide students with knowledge and understanding of the Nuclear Fuel Cycle and its environmental impacts, radioactive wastes, the challenges and possible solutions associated with nuclear decommissioning and waste disposal.

Syllabus

This module will teach the following:

Types of radiation and their hazards
 Nuclear Fission
 How a nuclear reactor works
 Nuclear Fuel Cycle: Processes; hazards, environmental impacts
 Radioactive Wastes: Classification; Sources; UK Legacy
 Nuclear Waste management/storage: Processing; Waste forms; Current situation re storage, forms
 Nuclear Decommissioning: Options for decommissioning strategies; Definitions of site states; Decommissioning challenges & technologies – case studies
 Nuclear Waste Disposal: Options for different wastes; Geological Disposal Facility (GDF) concepts; Challenges: engineering; scientific; socio-political

Case studies will be used to illustrate the topics covered

Learning Outcomes

On Completion of the module, the student is expected to be able to:

LO: 1	Demonstrate knowledge and understanding of the Nuclear Fuel Cycle (NFC) and the associated hazards and environmental impacts (including wastes)
LO: 2	Demonstrate knowledge and understanding of the decommissioning process
LO: 3	Demonstrate knowledge and understanding of the waste disposal options for different classifications of nuclear waste

(UK SPEC suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)

Assessment of Learning Outcomes - Criteria

Learning Outcome: 1

	Criteria
1	Ability to identify the stages of the nuclear fuel cycle and explain their role in nuclear energy generation
2	Ability to identify and describe the hazards associated with the different stages of the nuclear fuel cycle
3	Ability to recognise and describe the different environmental impacts arising from the stages of the Nuclear Fuel Cycle

Learning Outcome: 2

	Criteria
1	Ability to describe the decommissioning process and the different stages involved
2	Ability to describe the 2 recognised different decommissioning strategies and the key differences between them.
3	Ability to evaluate the radiological, safety, technical, financial and socio-political impacts of the 2 different decommissioning strategies
4	Ability to recognise the challenges and hazards associated with decommissioning

Learning Outcome: 3

	Criteria
1	Ability to define the different categories of radioactive wastes and give examples from different sources
2	Ability to describe the preferred waste disposal option for each category of radioactive waste
3	Ability to explain the key criteria to be considered with regard to siting a Geological Disposal Facility
4	Ability to explain the multibarrier concept and the barrier functions in a Geological Disposal Facility

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

To Pass the module, students need to gain a summative mark of: 50%

Description	Semester	Start Week	Duration	Weight	Submission Week	Linked Criteria
Decommissioning Information Leaflet	2	2		20%	6	
Essay	2	4		40%	11	
Online test. Open Book: Lecture notes; student's notes from personal study	3		1.00	40%	E	

Principles of Assessment Feedback

Principles of assessment are incorporated in the following ways

The assessments align with the learning outcomes

Detail on the assessment method, timetable and marking criteria are available to all class participants at the start of the course

Assessment is provided against clearly defined criteria

Additional Information

none

Resit Procedure

Students must 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 resit diet in July/August. This re-examination will consist entirely of coursework with resit assessment procedures as above. The resit mark will be 100% of the resit coursework. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

* key chapters

Nuclear energy - an introduction to the concepts, systems, and applications of nuclear processes - Murray & Holbert, 2014

*Chapter 23 – Radioactive Waste Disposal

Nuclear fuel cycle science and engineering - Crossland, 2012

*Chapters 2, 15, 18, 19

Nuclear decommissioning - planning, execution and international experience - Laraia, 2012

*Chapters 2, 3, 6, 10-15, 21, 22, 25

Radioactive waste management and contaminated site clean-up: processes, technologies and international experience - Lee, Ojovan & Jantzen, 2013

*Chapters 1, 2, 4 – 6, 7, 16, 17; any chapter from chapters 10 – 23 (other than ch 16 & 17)

Infrastructure systems for nuclear energy – Hsu, 2014

Module Timetable

Week	Semester 1	Semester 2
0		
1		
2		
3		
4		
5		
6		Submission 20%
7		
8		
9		
10		
11		Submission 40%
E		

Date of Last Modification

06-11-2025