CL906 SITE INVESTIGATION

Registrar: Dr P SENTENAC	Taught To (Programme): SITE INVESTIGATION	
Other Lecturers Involved: Mr Phil Amos (Industry ERS Ltd)	Credit Weighting: 10	Semester: 1
Assumed Pre-requisites: None	Compulsory/ elective class	Academic Level: 4 and 5

Class Format and Delivery (hours):

Lecture	Tutorial	Laboratory	Coursework	Project	Private Study	Total
24	8	0	30	8	60	130

Class Aim(s)

To provide an insight into the site investigation and risk assessment of obstructed, derelict and contaminated land, including the complete sequence of a site investigation (desk study, sampling, data collection and detection techniques).

Learning Outcomes

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

LO1   Understand the role of site investigation in geotechnical design, considering in particular urban development for derelict or contaminated land

LO2 Possess knowledge of the relevant planning advice and legislation

LO3 Undertake a site investigation & identify significant hazards

LO4 Carry out a complete sequence of a site investigation on site (Desk study, Site sampling organisation and techniques, sampling strategy, sampling techniques implementation, zoning and monitoring)

LO5 Determine Appropriate Geophysical detection technologies & strategies

LO6 Make decisions on sampling survey based on technical solutions, risk management, planning & financial constraints

LO7 Data modelling and interpretation of current risk assessment model CLEA

Syllabus

Site Investigation
- Desk study, Previous field data, geology maps and archives
- Case study from company ERS Glasgow
- Sampling techniques
- Sample size, methodology for soil/groundwater/gas sampling
- Invasive detections techniques for site investigation
- Geotechnical sampling (techniques used, cost, location, organisation)
- SPT, CPT (presentation from company FUGRO)
- Geophysical non-Invasive detection techniques for site investigation

- Risk Assessment Models (CLEA, REBECCA.CONSIM), Over ARUP risk register example
- CLEA software tutorial applied to contaminated site
- Practical case studies and tutorials from Industry (ERS)

Assessment Criteria

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

LO1-LO3: *SITE INVESTIGATION ORAGANISATION*
C1 *Engineering Analysis Derelict land Site Visit Exercise (*Mount Vernon Glasgow),
Hazards and risks. Site assessment and treatment selection.
Desk study methods, site reconnaissance, historical maps, previous field data, geology maps and archives. Zoning of the site and sampling strategy. Non intrusive investigation planning. Choice of different techniques by student group leaders.

C2 *Group poster project*- Full site assessment including risk assessment, risk management and risk monitoring.
Free choice from literature, publications, industrial archives and web sources

LO6-LO7
RISK ASSESSMENT MODELS EXPERTISE

C1 2 Tutorials practice with CLEA software. 1 of the tutorials is given by an industrial (ERS) on a practical case study. Groups of 5 students are undertaking a live desk study with a real contaminated site.

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.

Feedback and results given 2 weeks after submission of assignments with solutions online.
Tutorials feedback and solutions given during the exercise.

1. Site visit exercise (30%) Week 6
     (a) Desk Study, site reconnaissance, zoning, sampling strategy,
     (b) Intrusive techniques, Non-intrusive techniques

2. Group project poster (20%). Week 10.
Site investigation + risk assessment + risk management of contaminated or derelict site

3. Exam (2h, 50%)

Recommended Reading

www.defra.gov.uk
www.environment-agency.gov.uk
www.contaminatedland.co.uk
Porteous, A. 2001. Dictionary of Environmental Science and Technology. John Wiley and Sons.

SR and CLR are contaminated land reports from the Environment Agency
CLR 8. Department for Environment, Food and Rural Affairs and The Environment Agency, 2002. Potential contaminants for the assessment of land. The Environment Agency.
CLR 9 - The first part sets out an approach to the selection of Tolerable Daily Intakes and Index Doses. The second part consists of toxicology reports (TOX reports) for the 10 priority contaminants recognised by CLR 8
SR2. Human health toxicological assessment of contaminants in soil. The Environment Agency.
SR3. Updated technical background to the CLEA model. The Environment Agency.
SR4. New CLEA model and Handbook. The Environment Agency.
TR1. Review of body weight and height data

CIRIA C700CD Construction over abandoned mine workings R Healy and JM Head
ISBN: 0-86017-700-9
CIRIA C573 A guide to ground treatment. (J Mitchell and FM Jardine) 2002. ISBN 0-86017-573-1

CIRIA C578. Brownfields – managing the development of previously developed land. A clients guide. (DW Laidler, AJ Bryce, P Wilbourn). 2002. ISBN:0-86017-578-2
CIRIA C557 Remedial engineering for closed landfill sites D L Barry, I M Summersgill, R G Gregory et al 2001 ISBN: 0-86017-557-X

Additional recommended reading for MSc in Geotechnics:
EC7 – extracts related to site investigation & BS5930
C.R.I. Clayton, M.C. Matthews and N.E. Simons, see http://www.geotechnique.info/

PLEASE NOTE:
Students need to gain a summative mark of 50% *(please delete as appropriate)* 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 / viva *(please delete as appropriate).*

Resit Arrangements

Coursework (100%)

Approved

Programme Director Signature: Dr Philippe Sentenac
Date of Last Modifications: 18/08/2022

Assessment and Feedback Schedule

Class Code	CL906/508	Class Title	Site Investigation

Brief Description of Assessment

2 Coursework based on problem solving, site visit and group project
1 exam of 2 hours

Feedback and results given 2 weeks after submission of assignments with solutions online.
Tutorials feedback and solutions given during the exercise.

1. Site visit exercise (30% weighting) Week 6
   (a) Desk Study, site reconnaissance, zoning, sampling strategy,
   (b) Intrusive techniques, Non-intrusive techniques

2. Group project poster (20% weighting). Week 10.
Site investigation + risk assessment + risk management of contaminated or derelict site

3. Exam in December end of semester (2h, 50% weighting)

Indicate in the tables below the Hand-Out (H), Submission (S) and Feedback (F) dates for each lab report/coursework/project and the timing of each Exam/Class Test (E), (T). Include duration of exam in brackets (e.g. E (2)).

Semester 1

Assessment type (& title)	LOs	Weight (%)	Individual / Group	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
Site report CW1	LO1-LO5	30	Group		H				S						
Group Poster	LO1-LO7	20	Group		H								S		

Semester 2

Assessment type (& title)	LOs	Weight (%)	Individual / Group	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period

Mapping Module Learning Outcomes to AHEP

Module Learning Outcome	Engineering Council AHEP competencies: Knowledge, Understanding and Ability
On completion of the class the student is expected to be able to LO1 Understand the role of site investigation in geotechnical design, considering in particular urban development for derelict or contaminated land	Understanding
LO2 Possess knowledge of the relevant planning advice and legislation	Knowledge
LO3 Undertake a site investigation & identify significant hazards	Understanding
LO4 Carry out a complete sequence of a site investigation on site (Desk study, Site sampling organisation and techniques, sampling strategy, sampling techniques implementation, zoning and monitoring)	Knowledge, Understanding and Ability
LO5 Determine Appropriate Geophysical detection technologies & strategies	Understanding and Ability
LO6 Make decisions on sampling survey based on technical solutions, risk management, planning & financial constraints	Knowledge, Understanding and Ability
LO7 Data modelling and interpretation of current risk assessment model CLEA	Knowledge, Understanding and Ability

JBM Programme Threads

Thread	Primary	Secondary	Contributory
Design	**LO1-LO3**		
Health, Safety & Risk Assessment	**LO6-LO7**		
Sustainability			**LO1-LO5**
Maths for Engineers			
Industrial Engagement	**LO4-LO5-LO6-LO7**		
Digital Technologies		**LO6-LO7**	