CONTAMINATED SITE REMEDIATION

Environmental Engineering Msc Program

2018/19 2nd semester

COURSE SYLLABUS

University of Miskolc
Faculty of Earth Science and Engineering
Institute of Environmental Management

Content

1. Course description, details

Course Title: Contaminated site remediation (Project practice)	**Credits: 4**
Type of course: compulsory	
Type (lec. / sem. / lab. / consult.) and Number of Contact Hours per Week: **2 lec. + 1 sem.**	
The degree of <u>theoretical</u> or practical nature of the course, " course's character "[13]: 50 (kredit%)	
Type of Assessment (exam. / pr. mark. / other): **exam.** Students will be assessed with using the following elements. Attendance:10 %; Midterm exam 40 %; Final exam 50 %; Total 100% Grading scale: % value — Grade 90 -100% — 5 (excellent) 80 – 89% — 4 (good) 70 - 79% — 3 (satisfactory) 60 - 69% — 2 (pass) 0 - 59% — 1 (failed)	
Position in Curriculum (which semester): **2nd**	
Pre-requisites *(if any)*: -	
Course Description:	
The course aims to enable registered students to identify soil and groundwater contamination issues, to train them in contaminated site investigation, remediation design and implementation. The students shall be able to understand the main elements of contaminated land management tools e.g. problem formulation, risk based target value setting and risk assesment, site investigation, hydrodynamic and contaminant transport modeling, remediation action, and monitoring. **The short curriculum of the subject:** • Setting the stage, context of contaminated site remediation • Historical overview of site remediation • The process of site remediation • Site Investigation on contaminated land • Type and behaviour of contaminants in the subsurface environment • Behaviour of contaminants in groundwater • Chemistry of site investigation; Threshold value systems and their role in remediation • Quantitative risk assessment and site specific, risk based remediation; • Remediation methods and aspects of their selection; • Remediation without excavation; Remediation with soil excavation • Hydrauliy protective measures; • Isolation from the environment; • Monitoring activities; • Hands-on simple case-study problems	
The 3-5 most important compulsory, or recommended **literature** (textbook, book) **resources**:	
• CLARINET and NICOLE (2001): The Sustainable Management and Remediation of Contaminated Land, Special Edition of Land Contamination and Reclamation, Editors: Bardos, P. and Lewis, A., Richmond, UK	

- David L. Russell - Remediation Manual for Contaminated Sites Hardcover 2nd edition, 2011
- Alok Bhandari, Contaminants of Emerging Environmental Concern, ASCE Publications, 2009

Competencies to evolve (see Appendix 1):

T1 – Knows and applies scientific and technical theory and practice related to the profession of environmental engineering.
T2 – Has a comprehensive knowledge of measurement technology and measurement theory related to the field of environmental engineering.
T3 – Knows and applies environmental and remediation procedures (operations, equipment, devices), environmental remediation methods.
T4 – Knows the operation of environmental protection facilities (especially water and wastewater treatment plants, hazardous and communal landfills, waste incinerators), their structures and the possibilities of their development.
K2 – Able to conduct publications and negotiations in his/her field in his/her mother tongue and at least one foreign language.
K4 – Able to complete tasks arising in international or cross-border projects and to present his/her research results and developed design documentation before social and professional forums.
K5 – During work, examines the possibility of setting research, development and innovation goals and strives to achieve them.
K6 – Able to plan in a complex way, implement and maintain engineering interventions in the fields of soil, subsurface, water, air, noise and vibration protection, wildlife protection, remediation and waste reduction, treatment, and processing.
K7 – Able to plan and conduct environmental sampling works, comprehensive laboratory testing and analysis, to apply monitoring systems, evaluate and document test results.
K8 – Able to apply complex environmental remediation methods, to prepare for remediation and to coordinate remediation.
K10 – Able to apply integrated knowledge of environmental equipment, processes, technologies, and related electronics and informatics.
A1 – Open and receptive to the knowledge and acceptance of professional, technological development and innovation in the field of environmental protection, and its authentic mediation.
A2 – Assumes the professional and moral values related to the field of environmental protection.
A3 – Seeks to plan and carry out tasks independently or in a working group at a professional level.
F1 – Can solve environmental engineering tasks independently, takes decisions carefully, in consultation with the representatives of other (mainly legal, economic, energy) fields, independently, takes responsibility for the decisions.
F4 – Shares the acquired knowledge and experience with formal, non-formal and informal information transfer with practitioners in their field.

Responsible Instructor (*name, position, scientific degree):*

Tamás Madarász Dr., associate professor, PhD

Other Faculty Member(s) Involved in Teaching, if any (*name, position, scientific degree*): István Székely, research assistant, Viktória Mikita PhD, research fellow

2. Course syllabus

Contaminated site remediation.
Course syllabus
2018/2019. II. semester
Environmental Engineering MSc

Course schedule plan:

Date	**planned topic**
February 14	Introduction of course material, syllabus
February 21	Report on major Industrial accidents and its env. impacts – individual assignment cases
February 28	*Conceptual site model – assingment – create the conceptual site model of your case*
March 7	Global change in remediation concepts – shift from threshold values to risk base remediation – The risk based remediation pros and cons, the SPR concept
March 14	Site investigation – Assignment: hands on activity – siting investigation boreholes
March 21	Delineation of contaminant plume, transport of pollutants in subsurface environment; *Hands on task – contourline design – distribution of contaminants in gw*
March 28	The contaminated site remediation task flow
April 4	Remediation methods – principles, classifications, in situ remediation technics1 source elimination
April 11	Remediation methods – principles, classifications, in situ remediation technics2 source elimination
April 18	Remediation methods – principles, classifications, on site remediation technics3 isolation techniques
April 25	Remediation methods – principles, classifications, on site remediation technics4 disposal
May 2	Remediation methods – principles, classifications, in situ remediation technics 5 passive techniques
May 9	Final Examination

3, List of final exam questions

1. Definition of a contaminated site
2. Introduce a casestudy of an industrial accident with global significance in environmental awareness, introduce the event and its environmental impacts
3. The task flow of contaminated site remediation
4. Conceptual site model – elements, significance,
5. Site remediation conventional and innovative methods in investigation
6. Physical and chemical properties of pollutants, - movement of contaminats under surface
7. SPR concept – significance, elements, consequences
8. Laboratory analysis – its significance in site investigation, shift in concepts and technologies
9. Contaminant threshold value definition and significance
10. Contaminant plume dynamics, protection of environmental media
11. Risk-based remediation target value – significance, elements of definition
12. Remediation technical interventions – classification, general concept, in situ, on site, off site methods
13. Remediation methods – elimination of source (detailed descriptin and explanation of methods)
14. Remediation of methods – isolation from environement (detailed descriptin and explanation of methods)
15. Remediation metohds, innovative methodologies (detailed descriptin and explanation of methods)
16. Passive and active remediation technologies (detailed descriptin and explanation of methods)
17. Monitoring principles, tools