ENVIRONMENTAL RISK ASSESSMENT AND REMEDIATION

Hydrogeologist Engineering and Environmental Engineering Msc Program

2021/22 1st semester

COURSE SYLLABUS

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

Content

1. Course description, details

Course Title: Environmental Risk Assessment and Remediation (Project practice)

Credits: 3

Type of course: compulsory/elective

Type (lec. / sem. / lab. / consult.) and Number of Contact Hours per Week: **2 lec.**

The degree of <u>theoretical</u> or practical nature of the course, " course's character "[13]: 70 (kredit%)

Type of Assessment (exam. / pr. mark. / other): **exam.**
Students will be assessed with using the following elements.

Attendance:	15 %
Short quizzes	10 %
Midterm exam	40 %
Final exam	35 %
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): **3rd**

Pre-requisites *(if any)*: -

Course Description:

Acquired store of learning:
The students will be familiarized with the basic concept and framework of Environmental and Human Health Risk assessment and its relationship to contaminated land remediation. The students shall be competent in reading and understanding risk assessment documentation and evaluating its correctness. They will be able to work together with other field specialists in a risk assessor team. They will get a brief introduction to remediation practices and their design and the European practice of remediation planning and monitoring.
The short curriculum of the subject:
History of Risk Assessment, principles and background of RA methodology, Overview of risk related terminology and definitions, Elements of HHRA methodology, Problem formulation, Exposure assessment, Toxicity assessment, Risk Characterization, Risk assessment and its role in site remediation, Risk interpretation, EU legislation and practice of RA methods, legal background, various applications of RA methods, risk based target value and its determination, Case studies.
Practical work: Hands-on activities of simple case-study problems.

The 3-5 most important compulsory, or recommended **literature** (textbook, book) **resources**:

- CARACAS (1998): Risk Assessment for Contaminated Sites in Europe, Volume 1: Scientific Basis; LQM Press, Nottingham, UK
- USEPA, (1986): Guidelines for Carcinogen Risk Assessment. 51 Federal Register 33992.
- Vegter, J.J. (2001): A Risk-Based Land Management Approach; Land Contamination and Reclamation, Vol. 9, No. 1, Richmond, UK

- Other to be
- Twardowska I., Allen H. E., Haggblom M. M, Stefaniak S.: Valiable methods of soil and water pollution monitoring, protection and remediation, Springer, 2006.
- Health Canada (1993): Human Health Risk Assessment of Chemicals from Contaminated Sites, Volume 1 and 2.: Risk Assessment Guidance Manual; Ottawa, ON.
- Covello, V. – Mumpower, J. (1985): Risk Analysis and Management: A Historical Perspective, Risk Analysis, Vol. 5, No. 2
- 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.

Competencies to evolve (see Appendix 1):

T1 – Knows and applies scientific and technical theory and practice related to the profession of environmental engineering.
T3 – Knows and applies environmental and remediation procedures (operations, equipment, devices), environmental remediation methods.
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.
K10 – Able to apply integrated knowledge of environmental equipment, processes, technologies, and related electronics and informatics.
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*):

Course syllabus and plan of the semester

Environmental Risk Assessment and Remediation for
Hydrogeologist Engineer & Environmental Engineering MSc students
2021/2022. I. semester

Course schedule plan:

Date	**Course topic/Lecture**	**Assignment**
September 6	Introduction of course material, syllabus	
September 13	Risk definition, concepts of risk, risk assessment, risk management, risk factors, SPR concept	
September 20	Field trip	
September 27	Human Health Risk Assessment methodology intro and Human Health Risk Assessment methodology 1. Problem formulation	Student presentations on selected major industrial accidents, introduction, environmental effects and risk
October 4	Report on major Industrial accidents and its env. impacts – individual assignment cases	Conceptual site model (CSM) of the selected industrial accident,
October 11	Human Health Risk Assessment methodology 2. Exposure assessment	Exposure calculation - Excercise
October 18	Human Health Risk Assessment methodology 3. Toxicity assessment	Toxicological databases – online excercie and homework assignment
October 25	Human Health Risk Assessment methodology 4. Risk Estimation	Risk 5/RBCL softvare application
November 1	*National holiday*	
November 8	*Mid-term exam*	
November 15	Contaminated site remediation, concepts, classification of remediation methods, site investigation	*Site investigation assignment for Hydrogeologist MSc students* *Softvare hands-on for Env. Eng MSc (remediation specialisations)*
November 22	Remediation methods – principles, classifications, in situ remediation technics	*Project development case study*
November 29	Remediation methods – principles, classifications, in situ remediation technics 2	*Project development case study*
December 6	Remediation methods – principles, classifications, in situ remediation technics 3	*Project development case study*
	Final course 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. Remediation concepts a shift in thinking – threshold value based remediation, risk based, site specific remediation
8. SPR concept – significance, elements, consequences
9. Laboratory analysis – its significance in site investigation, shift in concepts and technologies
10. Contaminant threshold value definition and significance
11. Contaminant plume dynamics, protection of environmental media
12. Risk-based remediation target value – significance, elements of definition
13. Remediation technical interventions – classification, general concept, in situ, on site, off site methods
14. Remediation methods – elimination of source
15. Remediation of methods – isolation from environement
16. Remediation metohds, innovative methodologies
17. Passive and active remediation technologies
18. Monitoring principles, tools