ENVIRONMENTAL RISK ASSESSMENT AND REMEDIATION

Hydrogeologist Engineering Msc Program

2019/20 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 theoretical 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

- 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 – It includes knowledge of hydrogeology, water resource management, water quality protection, water treatment, production and waterworks operat

T3 – Thorough understanding of the concepts and principles of engineering geology and civil engineering and their processes.

K2 – Ability to process information from the knowledge frontiers of professional experience of the discipline, ability of problemsolving, and interpreting hydrogeological issues.

K4 – Ability to effectively apply water production techniques and knowledge of modern well construction technologies.

K5 – Ability to apply design, knowledge and technologies related to water supply and water treatment at a high level.

K10 – Prepared to effectively apply relevant national and European professional, environmental and conservation legislation

F1 – Act independently and proactively to solve professional problems.

F4 – In decisions, takes into account the principles and application of environmental protection, quality, consumer protection, product liability, equal access, health and safety at work, technical, economic and legal regulation and engineering ethics.

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*):

2. Course syllabus

Environmental Risk Assessment and Remediation
2019/2020. I. semester
Hydrogeology & Environmental Engineering MSc

Date	**planned topic**	**Assignment**
September 9	Introduction of course material, syllabus	
September 16	Risk definition, concepts of risk, risk assessment, risk management, risk factors, SPR concept	Student presentations on major industrial accidents, introduction, environmental effects and risk
September 23	Report on major Industrial accidents and its env. impacts – individual assignment cases	
September 30	Human Health Risk Assessment methodology intro and Human Health Risk Assessment methodology 1. Problem formulation	Conceptual site model development
October 7	Human Health Risk Assessment methodology 2. Exposure assessment	Excercise – exposure assessment
October 14	Human Health Risk Assessment methodology 3. Toxicity assessment	Toxicological databases – onlince excercie
October 21	Human Health Risk Assessment methodology 4. Risk Estimation	Risk 5 softvare application
October 28	*Mid-term exam*	
November 4	Contaminated site remediation, concepts, classification of remediation methods, site investigation	*Site investigation assignment*
November 11	Remediation methods – principles, classifications, in situ remediation technics	*Project development case study*
November 18	Remediation methods – principles, classifications, in situ remediation technics 2	*Project development case study*
November 25	Remediation methods – principles, classifications, in situ remediation technics 3	*Project development case study*
December 2	Report on development project	
December 9	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