

## E-COURSE: Environmental risk assessment and management

---

Host institution	National University of Mongolia, School of Engineering and Applied Sciences
Credits	6 ECTS (optional course)
Lecturers	Battsengel Enkhchimeg (National University of Mongolia)
Level	MSc and PhD course
Course duration	16 classes
Type	Research

### Summary

Modern society, while taking advantage of the benefit from the advent of science and technology need to assess, understand and govern the risks arising from their use. Through the lectures and discussions in risk area by students are expected to deepen their understanding of risk and risk management.

The course includes data collection, data analysis, individual and group exercises, field work, seminar presentation and report writing.

### Target student audiences

MSc and PhD students in environmental science, including chemistry, soil, water and air.

### Prerequisites

Required courses (or equivalents):

- Environmental science
- Applied chemistry (If available)

### Aims and objectives

The objective of this course is to introduce the students with knowledge of risk assessment and management, its concepts, risk assessment calculations, applications, and policy making. In addition, this course considers practical insights into how to calculate risk assessments, how to avoid hazards, how to make risk management policies and decisions, and how to work with local communities and businesses. It will be importance for practical work to learn how to make efficient management based on qualitative and quantitative research methods.

### General learning outcomes:

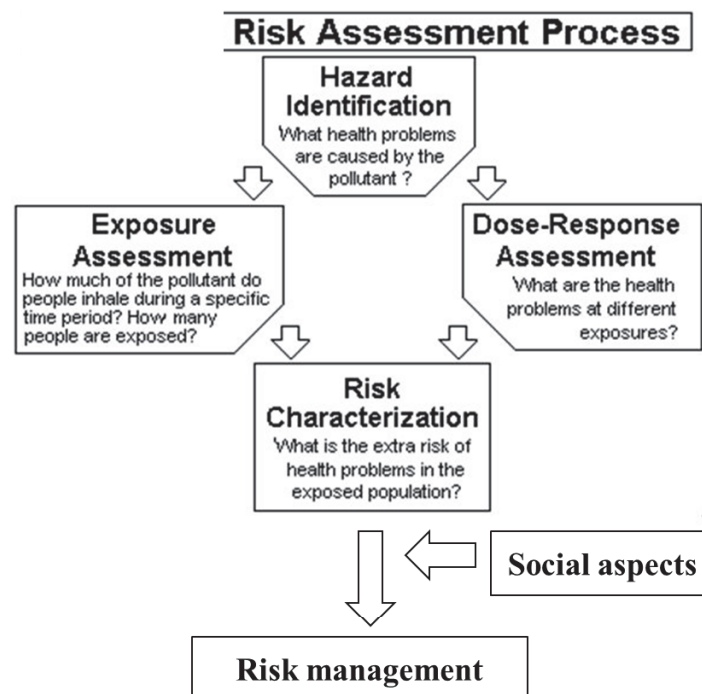
The knowledge of risk assessment and risk management, as well as ability to calculate and analyze risk assessments; and contribute to society as a risk management leader by developing, preparing, responding to, or making appropriate decisions.

### Applicable learning outcomes:

- Hazard identification
- Exposure assessment
- Dose response
- Risk characterize
- Statistical analysis
- Process the results in R language
- Writing reports, group discussions and interviews

The content of the Risk Management course covers the following key components. These include:

## How does one go about creating a Risk Assessment?



### Overview of sessions and teaching methods

Teaching and learning methods are based on student-centered teaching methods and can take many forms, including lectures, dialogues, seminars, homework, reports, research, data collection, analysis, and presentations.

### Assignment

During the course, each workshop will be given a topic according to the lecture, will be worked in a team, and issues will be raised. These include:

1. Select a site that is at risk and discuss it as a team, taking into account the current situation.
2. Conduct a health risk assessment at the selected site
3. Conduct an ecological risk assessment at the selected site
4. Conclusions based on statistical data and social conditions
5. Make a decision on risk management based on the above analysis

## Grading

The students' performance will be based on the following:

- ~ Level of preparedness for participation in class discussions and seminars (20% from 100% for active participation and demonstrated familiarity with the course readings to 0% for completely ignoring in-class discussions);
- ~ Contribution to group assignments and demonstration of individual work (40% from 100% for clearly demonstrated input to 0% for non-participation);
- ~ Quality of the approach application and reporting and presenting (40% from 100% for clearly shown the report and presentation to 0% for non-participation);

## Course schedule

Class	In-class hours	Topic	Type
1	4	~ Basic concepts of risk (Purpose, significance, scope and basic concepts of risk assessment)	Lecture
2	4	~ Integrated risk information system (Purpose, scope, how to identify and plan risk assessment)	Lecture Seminar
3	4	~ Dose-response assessment (Consider the relationship between dose and toxicity,)	Lecture Seminar
4	4	~ Exposure assessments (environmental impact assessment such as land change, chemicals, climate change and disease)	Lecture Seminar
5	4	~ Health risk assessment (Part I) Purpose, scope, how to identify and plan risk assessment	Lecture Seminar
6	4	~ Health risk assessment (Part II) Soil, heavy elements, use, formulas	Lecture Seminar
7	4	~ Health risk assessment (Part III) Drinking water, consumption, parameters, formulas	Lecture Seminar
8	4	~ Health risk assessment (Part IV) Air, applications, parameters, formulas	Lecture Seminar
9	4	~ Ecological risk assessment (Part I) Purpose, scope, identify and plan	Lecture Seminar
10	4	~ Ecological risk assessment ~ (Part II) Components of ecological risk and their definition	Lecture Seminar
11	4	~ Risk communication (Part I) Scope and basic concepts	Lecture Seminar
12	4	~ Risk communication ~ (Part II) Strategy Definition and Public Relations	Lecture Seminar
13	4	~ Risk communication ~ (Part III) Methods for identifying and collecting information on the interests, needs and attitudes of community members	Lecture Seminar
14	4	~ Risk Management (Part I) How to make decisions based on risk factors, characteristics and calculation results	Lecture Seminar
15	4	~ Risk Management (Part II) ability to choose the type of risk management as a result of calculating the factors affecting health in the area	Lecture Seminar
16	4	~ Presentation of Assignment All Group members will conduct risk assessments in their chosen area. The results will be presented and discussed with other groups.	Seminar

## Literature

### Compulsory:

1. Lawrence V. Tannenbaum 2018. Ecological Risk Assessment. Innovative Field and Laboratory Studies.
2. David A. Belluck and Sally L. Benjamin 2001. Environmental Risk Assessment Reports. A Practical Guide to Understanding, Managing, and Reviewing.
3. John R. Fowle and Kerry L. Dearfield, 2000. Risk characterization handbook. U.S. Environmental Protection Agency.
4. Guidelines for Exposure Assessment 1992. Risk Assessment Forum U.S. Environmental Protection Agency Washington, DC
5. Dose response assessment 2008. Principles for Modelling Dose–Response for the Risk Assessment of Chemicals
6. Benchmark Dose Technical Guidance 2012. Risk Assessment Forum. U.S. Environmental Protection Agency. Washington, DC 20460

### Recommended:

7. Chester D. Rail. Groundwater contamination. Volume 2. Management containment risk assessment and legal issues. CDR - Environmental Regulations - Consultation and Research
8. <https://www.epa.gov/risk>
9. <https://www.epa.gov/risk/risk-tools-and-databases>