Environmental and Health Risk Assessment (JEE 682)
(Course coordinator: Dr. Sebastien Bonnet)

1. Course Description *[Briefly describe the course content, especially how it supports the PLO]*.
Environmental and health risk assessment is a graduate course that introduces students to the fundamentals of environmental risk assessment through a series of lectures, case-studies, and readings. In this course, students learn to identify, hazards and exposure pathways relevant to water, air and soil and to predict risks to human health. Various approaches and methods to assess health risk are presented, as well as the assessment of externalities. The evaluation of uncertainties is also covered. Risk management and communication are included in the course to address risk prevention and mitigation.

2. Target Knowledge, Skills, and Abilities (KSA) [*Indicate what KSA this course will provide the students with*].
This course provides students with knowledge about the concept of risk assessment, skills to assess health impacts from environmental pollution exposure based on a variety of techniques, and the ability to critically analyze health risks and identify potential mitigation and prevention measures.

3. Target group of students [Indicate if the course is opened for all students, including non-degree ones]
The course is opened to Master and PhD students with a background in science, technology or engineering.

4. Pre-requisites [Indicate if the course requires some pre-requisites].
This course does not require any pre-requisites.

5. Course Learning Outcomes [*Indicate the alignment of CLOs with the PLOs*].
CLO 1: Able to apply risk assessment concepts, methodologies and frameworks to assess and manage human health risks from environmental hazards
CLO 2: Able to identify and evaluate options to reduce risk and meet regulatory requirements related to air, water, land pollution
CLO 3: Able to evaluate risk management strategies to manage human health risks in prescribed settings

6. Method of Teaching and Learning [Specify if it would be 1/ Online; 2/ On-site; 3/ Hybrid; 4/ Online for lectures and On-site in small groups for discussions and workshops; 5/ Others].
This course will be delivered in a hybrid format, i.e. a combination of online and on-site lectures and presentations.

7. Course Outline and Organization [*Following KMUTT's recommendations, a course should be organized based on the OBEM approach. A course can, therefore, be split over the semester, but also organized in consecutive weeks as before. A module can contain from 2 up to a maximum of 5 lectures depending on the target LOs. A 3 credits course can be composed of 3 to a maximum of 5 modules. In addition, indicate if **the course is opened every Semester or a specific Semester**]*.

This course is opened every alternative Semester. For the Semester 2/2023, this course is scheduled every Tuesday morning (9.00 am – 12.00 pm) from 16 January to 9 May 2024.

MODULE 1: BASICS OF EPIDEMIOLOGY AND STATISTICS
MLO 1: Gain basic knowledge on epidemiology
MLO 2: Gain knowledge on basic statistics for risk assessment
MLO 3: Can perform basic statistical analysis for risk assessment

Lecture No.: Title	Name of Instructor	Teaching Period
Lecture 1: Basics of epidemiology: Measures of risk in epidemiology & Epidemiological studies	Dr. Sebastien Bonnet	16 Jan. 2024
Lecture 2: Basic statistics for risk analysis: Data, graphs and descriptive statistics	Dr. Sebastien Bonnet	23 Jan. 2024
Lecture 3: Basic statistics for risk analysis: Inferential statistics	Dr. Sebastien Bonnet	30 Jan. 2024

MODULE 2: HEALTH RISK ASSESSMENT, MANAGEMENT AND COMMUNICATION
MLO 1: Can perform health impact assessment based on US EPA method
MLO 2: Understand the importance of risk management and communication
MLO 3: Can use a decision tree to make risk management decision

Lecture No.: Title	Name of Instructor	Teaching Period
Lecture 1: An introduction to health impact assessment based on US EPA approach	Dr. Sebastien Bonnet	6 Feb. 2024
Lecture 2: Risk Analysis: Risk assessment, risk management and risk communication	Dr. Sebastien Bonnet	13 Feb. 2024
Lecture 3: Risk Management: Decision tree analysis	Dr. Sebastien Bonnet	20 Feb. 2024

MODULE 3: TRANSPORT OF POLLUTANTS, EXPOSURE AND HEALTH IMPACTS
MLO 1: Gain knowledge on transport and transfer of pollutants in soil/water and air
MLO 2: Understand residential and occupational exposure
MLO 3: Can critically analyze results from health impact assessment studies

Lecture No.: Title	Name of Instructor	Teaching Period
Lecture 1: Transport and transfer of pollutants in soil/water	Prof. Shabbir H. Gheewala	5 Mar. 2024
Lecture 2: Transport and transfer of pollutants in air	Dr. Kasemsan Manomaiphiboon	12 Mar. 2024
Lecture 3: Case study of a metal finishing industry	Dr. Sebastien Bonnet	19 Mar. 2024

MODULE 4: ENVIRONMENTAL BURDEN OF DISEASE AND EXTERNALITIES		
MLO 1: Understand the WHO's environmental burden of disease method **MLO 2:** Can assess health impacts based on the WHO's on burden of disease method **MLO 3:** Can use US EPA BenMAP tool to assess and monetize health impacts		
Lecture No.: Title	Name of Instructor	Teaching Period
Lecture 1: Environmental burden of disease method: Relative Risks and DALYs	Dr. Sebastien Bonnet	26 Mar. 2024
Lecture 2: Monetisation of health impacts: WTP and VSL	Dr. Sebastien Bonnet	2 Apr. 2024
Lecture 3: Assessment of health Impacts using BenMAP – Case-study of Bangkok	Dr. Thao Pham Thi Bich	23 Apr. 2024
Lecture 4: Overview of BenMAP-CE – Hands-on session	Dr. Thao Pham Thi Bich	30 Apr. 2024

8. Evaluation Methods [*Indicate the methods used to evaluate the LOs, e.g. online or on-site exams, assignments, take-home exams, projects, etc. Following KMUTT recommendations, the LOs evaluation should be organized at the end of each module*].

Module 1 & 2: *50% of course grade*
> 27 February 2024: Mid-term examination (50%)

Module 3 & 4: *50% of course grade*
> 7 May 2024: Final examination (50%)

9. Guided References/Resources [*Indicate the references/resources students are recommended to consult for the modules/course*].

1. Guido Sonnemann, Francesc Castells and Marta Schuhmacher (2004) Integrated life cycle assessment and risk assessment for industrial processes, Lewis publishers.
2. Gordon Granahan and Franck Murray (2003) Air pollution and health in rapidly developing countries, Earthscan publications Ltd, London.
3. Mark Z. Jacobson (2002) Atmospheric pollution, history, science and regulation, Cambridge University Press
4. Daniel M Kammen and David H Hassenzahl (2001) Should we risk it? Exploring environmental, health, and technological problem solving, Princeton University Press.
5. Jack Daugherty (1998) Assessment of Chemical exposures – Calculations methods for environmental professionals, Lewis publishers.