Management of resources

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Work load: 25 h lectures and 15 h exercises; round table discussions
Number of credits: 5ECTS
Course code: 8KUEVN24/8KUEVN28

Module Topics: Theory and methodology of sampling (S. Brochot)

Economy and geopolitics of mineral raw materials (I. Annesley and M. Jebrak)

► *Objectives and learning outcomes:*

Theory and methodology of sampling **and** Economy and geopolitics of mineral raw materials – these two modules present the basics needed to understand and assess the economic aspects of raw materials and the mineral supply/demand market.

After completion of the course, the student will be able to understand how their industry relates to and can contribute to the transition to sustainability on a global basis. Also, the student will be able to carry out an assessment/risk analysis of individual raw materials.

► *Course Content:*

The course comprises the following main topics:

Theory and methodology of sampling:

1. Introduction the theory of sampling
2. Sampling techniques. From selection to implementation in the field.
3. Evaluation methods to access the quality of a sampling campaign.
4. Data analysis and optimization of sampling methods.

Economy and geopolitics of mineral raw materials:

5. Macro-economics (and associated micro-economics) of Mineral Resources. World repartition and supply/demand strategy, legal and fiscal aspects (9h+6h exercises)
6. Mineral Resources classification: group/values/volumes/supply network (12h+6h),
7. Impact of new technologies and of sustainable development, structural and cycling factors (4h+3h).

The course is setup as a series of keynote lectures presenting the basics of the theory and methodology of sampling and the economy and geopolitics of mineral raw materials from a global perspective. These lectures are accompanied by some practical training on mineral resource assessments/risk analysis. Small groups (2-3 people) of students carry out an assessment/risk analysis study of a global critical metal using a real case study as a guide to doing so. This exercise aims at training the student to search the available appropriate literature for raw materials and mineral supply/demand markets, so to undertake this study using the most appropriate tools to solve the problem.

The course outline is as follows:

Theory and methodology of sampling:

1. Main approach to organize sampling campaign,

2. Learn the theory of Gy and sampling rules,

3. Optimization of the chain of sampling,

4. Data validation, due diligence and optimization of analyses methods

Economy and geopolitics of mineral raw materials:

1. General Introduction to the global mineral industry: substances, deposits, producing and consuming countries, mining and consuming companies, tax-producing countries; etc.

2. The industrial actors: state, private banks, international organizations, functioning of LME, marketing types depending on the raw material.

3. Macro-economics (and micro-economics) of mineral raw materials; the major world markets of mineral raw materials and the ways of pricing; supply problems with Western World strategic metals (i.e. critical or rare or monopolized metals).

4. Classifications of mineral raw materials: group / value / volume / channel. Analysis of changes at various time scales; influence strategies.

5. Impact of sustainable development.

6. Strategy and impact of new technologies.

► *Prerequisites :*

The course is for students from a diverse academic background. It assumes an intermediate knowledge of mathematics (statistics), chemistry, physics and geology. The course assumes no prior knowledge of the minerals industry; however limited knowledge of the major and minor players in the minerals industry is an asset.

► *Assessment method:*

The evaluation/assessment of students is both content-based and impact-based, using real-life data sets. This will take place in the form of:

(I)   Continuous evaluation during the training classes (including participation, leadership, initiatives, technical choices, quality of thinking);

(II)   Written exam;

(III) Quality of oral defense PPT presentation with accompanying report on training sessions (i.e. final evaluation is based on reports and oral defense about the case study).

► *EIT Overarching Learning Outcomes (OLOs):*

This course contributes mainly to two overarching learning outcomes:

EIT OLO 3: The ability to think beyond boundaries is clearly developed in this course. The course uses a multi-disciplinary approach which integrates the physical and earth sciences with the social sciences, ecology, economics, and the principles of raw materials (mineral resources) sustainability, and assesses this integration using modern computer and statistical tools.

EIT OLO 5: The ability to use leading-edge, research methods, processes, and techniques; in order to establish how their raw materials industry relates to and can contribute to the transition to sustainability.