RESOURCES MODELLING AND EVALUATION

Prof. I. ANNESLEY and J. SAUSSE

Work load: 25 h lectures and 25 h exercises
Number of credits: 5ECTS
Course code: 8KUEVN23

► *Objectives and learning outcomes:*

3D Geomodeling applied to mineral resources exploration and estimation – these two modules present how to use 3&4D geomodelling methods to define exploration targets at mining camp and ore deposit scales and estimate resources at mine scale.

After completion of the course, the student is able to:

- Analyze mining exploration data in the light of conceptual ore concentration models to define exploration targets
- Create a 3D geological model of a given area from typical data (drillholes, interpretive cross-sections).
- Create an ore concentration model using multivariate and geostatistical techniques and assess mineral resources.

► *Contents of the course:*

- Creating a 3D model from sparse geological data including maps, wells, and field observations;
- Processing of multi-source datasets using multivariate techniques (PCA, weights of evidence, logistic regression, etc);
- Definition of exploration targets from exploration dataset
- How to use geological 3D models for inverting geophysical gravity and electro-magnetic data surveys
- Using 3D geomodels and database to investigate problems linked to mining exploration and resource evaluations;
- Define exploration targets using geomodel and ore deposit model
- Resource estimations using geostatistics methods on 3D models (notion of support, managing multivariable dataset, tonnage/cut-off chart, notion in mining economy)
- Application to real case studies.

The course is organized as keynote lectures presenting the bases of geomodelling, followed by some practical trainings on computers. Group of students will have to conduct the study of a real case

study from the data integration to the estimation of resources including some economic aspects. This exercise aims at training the student in the choice of the most appropriate tools to solve a problem link to exploration and exploitation.

► *Assessment:*

The class is assessed by a short exam and a project on real mining data using SKUA-GOCAD. Students work on the data, present their work in a written report and in an oral presentation. It is also impact-based through several modeling projects on both simplified and real life mining data sets. Assessment criteria include participation, leadership, initiatives, technical choices, quality of thinking, results and quality of presentation. Continuous evaluation is performed during the training classes and final evaluation is based on reports and oral defense about the case study.

► *EIT Overarching Learning Outcomes (OLOs)*

This course mainly contributes to two overarching learning outcomes:

EIT OLO 3: The ability to think beyond boundaries is clearly developed in this course, through the combined use for various geophysical, geochemical and geological data and their fusion using modern computer and statistical tools.

EIT OLO 5: The ability to use cutting edge research methods, processes and techniques and to apply these in cross-disciplinary teams and contexts is also developed. Indeed, this class incorporates many new research developments in the field of Numerical Geology attested by recent papers provided to students.

► *Prerequisites:*

Course on geostatistics, ability to use computer at advanced level, notions in mining geology, basic knowledge in geology.