

Course/module description

Course provider (institution): Kyrgyz Mining-Metallurgical Institute named after academic U. Asanaliev
Course title: Innovative Methods and Technologies in Searching and Exploring Mineral Resources
Target group: PhD Students (Applied Geology Program)
Type (compulsory/optional): Elective course
Number of ECTS credits allocated (if applicable); estimated workload: 10 ECTS (300 academic hours)
Mode of delivery (face-to-face/ distance learning etc.); number of contact hours: 90 hours (face-to-face hours)
Language of instruction: Kyrgyz/Russian/ English
Prerequisites and co-requisites (if applicable): Basic knowledge of mineralogy, petrology, and structural geology, Knowledge of English for reading literature
Course aims: This course is designed to provide advanced knowledge and skills in the innovative methods and technologies employed in the exploration and search for mineral resources. The course will cover cutting-edge techniques, tools, and technologies utilized in geological surveying, mineral prospecting, and resource estimation. Emphasis will be placed on interdisciplinary approaches, incorporating geology, geophysics, geochemistry, and remote sensing technologies.
Learning outcomes: Student will be able to: LO1: Understand the fundamental principles of mineral exploration and resource estimation. LO2: Analyze and evaluate innovative methods in geological surveying and prospecting. LO3: Apply advanced geophysical and geochemical techniques for mineral detection. LO4: Utilize remote sensing technologies in the identification and characterization of mineral deposits. LO5: Critically assess the environmental and social implications of mineral exploration methods. LO6: Synthesize interdisciplinary data to make informed decisions in mineral resource management.
Course content: <ol style="list-style-type: none">1. Introduction to Mineral Exploration. Overview of genetic models for ore deposit formation. Advanced field techniques for structural analysis and interpretation.2. Geological and Geochemical Methods. Advanced geological mapping techniques. Geochemical prospecting and sampling methods. Integration of geological and geochemical data3. Geophysical Exploration Techniques. Principles of geophysics in mineral exploration. Application of seismic, magnetic, and gravity methods.4. Remote Sensing Applications. Basics of remote sensing in geology. Satellite and aerial imagery analysis for mineral identification. Integration of remote sensing data with other exploration methods5. Advanced Data Analysis Techniques.6. Environmental and Social Considerations. Environmental impacts of mineral exploration. Social and ethical aspects of mining activities.7. Case Studies and Industry Applications. Review of successful mineral exploration projects. Guest lectures from industry experts. Analysis of challenges and solutions in the field
Recommended or required reading and other learning resources/tools: <ol style="list-style-type: none">1. Lecture Materials2. The course materials will be available through ELMS

<ul style="list-style-type: none"> 3. The Power Point lecture slides are available for download as PDF files at the course website. 4. Electronic resources on the lecture topics are available at the course website. 5. The class notes, latest journal articles and references related the course topics will be referred to and/or distributed during the lectures. 6. Text and Reference Books (below)
<p>Planned learning activities and teaching methods:</p> <ul style="list-style-type: none"> 1. Regular lectures, instructions, planning .; 2. Labs and computing tasks; 3. Individual practical exercises with examples of materials from mineral deposits; 4. Class discussions.
<p>Assessment methods and criteria:</p> <ul style="list-style-type: none"> 1. Mid-term exam (25%) 2. Labs and computing tasks (25%) 3. Class discussion/participation (10%) 4. Final exam 40% <p>Grades: A, B, C, D, E, Fx, F</p>
<p>Additional information: Course instructor – prof. Maralbaev A.O.</p>

- 1. Authors: Avdonin V.V., Ruchkin G. V., Shatagin N. N., Search and exploration of mineral deposits., 2007.
- 2. Author: S. K. Haldar, "Mineral Exploration Principles and Applications". 2012.
- 3. Authors: W. M. Telford, L. P. Geldart, and R. E. Sheriff «Applied Geophysics" 1990.