Course/module description

Course provider (institution): Kyrgyz Mining-Metallurgical Institute named after acadenic U. Asanaliev
Course title: Advanced Geoinformation Technologies in Geology
Target group: PhD Students (Applied Geology Program)
Type (compulsory/optional): Compulsory
Number of ECTS credits allocated (if applicable); estimated workload: 5 ECTS (150 academic hours)
Mode of delivery (face-to-face/ distance learning etc.); number of contact hours: 45 hours (face-to-face hours)
Language of instruction: Kyrgyz/Russian/ English
Prerequisites and co-requisites (if applicable): General Geology, Structural Geology, Knowledge of English for reading literature
Course aims: The aim of this course is to equip PhD students in the Applied Geology Program with comprehensive theoretical knowledge and practical skills in utilizing specific modern information technologies, particularly focusing on GIS. The course aims to delve into the tools, systems, and applied software of GIS technologies, emphasizing their role in mineral resources exploration. Students will gain proficiency in the collection, analysis, and presentation of spatially distributed geological information through hands-on experience with advanced GIS tools and methodologies.
Learning outcomes: Student will be able to: LO1: Articulate the basic concepts of geographic information systems (GIS) and remote sensing technologies, understanding their special role in mineral resource prospecting and exploration. LO1: Prepare and process data from geochemical samples obtained in the field, incorporating remote sensing data for integrated analysis. LO1: Use geochemical data in geological modeling of mineral deposits using advanced geological modeling techniques along with GIS methodologies. LO1: Create a digital geological map that integrates data from multiple sources, including remote sensing imagery, for a holistic view. LO1: Analyze digital geological maps, considering the integration of remote sensing data and GIS functions to obtain the necessary information.
Course content: 1. Introduction to GIS technologies. Tools, systems and applied software of GIS-technologies. Role of GIS in mineral resources exploration. The significance of remote sensing in mineral resources exploration. 2. Network solutions in GIS technologies. Types and formats of data used in automated information technologies. 3. Organization and structure of topographic data in GIS. 4. Technologies for entering spatial data into GIS; data sources for GIS. 5. Geological model of mineral deposits for representing spatial data in GIS. Remote sensing data for a comprehensive geological models. 6. Raster representation of data in a GIS. 7. Surface relief modeling and methods for displaying relief in GIS; Solving different tasks by using digital elevation models.

8. DBMS and GIS applications (Micromine, Dolon, QGIS). The concept of distributed databases. Remote access to databases from the network
9. Solving various tasks by using data stored in a GIS; Analyzing spatial data with different functions; solving specific problems using GIS tools.

Recommended or required reading and other learning resources/tools:

1. Lecture Materials
2. The course materials will be available through ELMS
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)

Planned learning activities and teaching methods:

1. Regular lectures, instructions, planning .;
2. Labs and computing tasks;
3. Individual practical exercises with examples of materials from mineral deposits;
4. Class discussions.

Assessment methods and criteria:

1. Mid-term exam (25%)
2. Labs and computing tasks (25%)
3. Class discussion/participation (10%)
4. Final exam 40%

Grades: A, B, C, D, E, Fx, F

Additional information: Course instructor – prof. Maralbaev A.O.

1.Authors: Chymyrov A.U., Bekturov A.K., Vkylbek uulu Belek «Geoinformation systems», Tutorial for performing laboratory work using the Quantum GIS program, 2021.

2.Authors: Chunuev I.K., Umarov T.S., Emilbek kyzy Akshoola, Guidelines for practical exercises in the discipline "Computer modeling of mineral deposits"