

Spring 2023

**American University of Central Asia**

**Exploration techniques and Geotechnics-301**

Exploration techniques and Geotechnics AGEO-301

Spring 2023 Syllabus

**Lecturer:** Assistant Prof. Cholponbek Ormukov

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**Course schedule** Tuesday 10:50

Thursday 10:50

**Consultation of students:**

Tuesday and Thursday 13:00 - 15:00

**1. Course Description:**

This course will introduce you to a range of geological and geophysical methods that can be applied to characterize the physical characteristics of the earth's crust, with direct application to the discovery and mapping of mineral and energy resources. The course will be divided into modules covering exploration methods commonly used in mineral and energy exploration. We will review the theoretical basis of each method, methods for collecting, presenting and analyzing data, and the appropriate, geologically constrained interpretation of the data. Students will learn the main types of exploration used in mining exploration.

Exploration is the process of finding deposits of minerals, coal, oil, gas or precious metals. The information collected during exploration is used to evaluate the location, size and quality of the deposit to determine if it can be extracted in an economically viable manner.

The course also addresses issues of engineering geology - a branch of geology that studies the upper horizons of the earth's crust and its dynamics in connection with human engineering and construction activities. Along with consideration of the basics of general geology (origin, physical properties, structure and composition of the Earth, etc.), the course outlines the origin, composition, structure and properties of minerals and rocks, as well as the basics of soil science. The endogenous and exogenous processes of the Earth's dynamics are also considered.

**2. Course Aims:**

The purpose of the course is to master the basics of theoretical and practical knowledge in the field of geological and geophysical exploration and also the basics of soil mechanics. This course aims to

introduce students to the methods used to measure and map the geological, geophysical and geotechnical characteristics of the earth's crust with applications to mineral and energy exploration.

### **3. Course objectives:**

1. Possession of general theoretical and practical skills of resource exploration
2. Possession of the scientific foundations of the exploration of minerals, energy and natural resources
3. Ability to give a general description of economic mineral and energy resources - geological, geophysical and geochemical.
4. Data collection in the field.
5. Demonstrated understanding of the importance of data quality – collection, analysis, processing methods.
6. To study the physical and mechanical properties of the soil.
7. Apply this knowledge to solve practical engineering problems.

### **4. Course Textbook :**

#### **Book:**

2 By V.N.S. Murthy - Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering (1st Edition) (9/25/02) 2002

**5. Lecture:** A typical class meeting will combine mini-lectures, discussions, group activities, multimedia presentations, and other demonstrations and activities to give you an opportunity to learn concepts in as active a manner as possible.

### **6. General course rules:**

1. Students must attend all classes and participate in all activities. Absence is not an excuse for not completing homework and other tasks. Do not forget to complete each task before the start of the class and be prepared to classes.
2. All written assignments must be submitted to the course before the deadline. Tasks submitted after the deadline will not be accepted and evaluated. Late submission will be decreased by subtracting 50% of the grade received.

Absence does not relieve the student of the obligation to check the website and email in the assignment or correspond with the teacher to extend the deadline for completing the assignment.

3. Skip alerts: when a student skips classes due to illness or other valid reasons it is excused absence. If you miss the test / exam due to illness / emergency, please contact the lecturer before the test and

present the medical certificate and authentication at the AUCA Medical Office. In this case, you will have the opportunity to test. In other cases, a missed test / exam will be counted as “zero”.

5. Review of work. Students who complete assignments on time are allowed to review them based on teacher feedback. The submitted documents and projects must comply with all the minimum requirements for assigning a rubric. If the assignment does not meet the minimum heading standards, it is considered incomplete work and must be completed by the student in order to be evaluated.

6. The class starts quickly at the appointed time. Being late for a lesson undermines the learning process and does not reflect superiority in the academic environment. Do not interfere with the class when leaving the room and returning back.

7. Laptops / tablets should not be used in the classroom without the approval of the instructor.

8. The use of a mobile phone is strictly prohibited. They should be silenced and removed throughout the lesson.

9. The presentation should be presented in class on the day they should. Late submission will be - 50% of the grade received.

10. Students are expected to follow university policies and student guidelines. All types of plagiarism are strictly prohibited.

## **7. Assignments/Assessment**

### Attendance - 10%

Attendance is required and is 10% of your final grade. To be successful in this course, you need to attend classes every time! Attendance sheets will be distributed in each lecture. Each unjustified absence will reduce your attendance score by 4%. If you become ill, you must notify the instructor and present an official document (certificate) from the doctor, especially if you are planning a presentation in the classroom or submit a written assignment. Four unjustified passes will result in an “F” for the entire course.

### Lectures activities – 15%

Participation means more than good attendance. Reading has a significant role in the development of students' analytical and critical thinking. You should be prepared to discuss readings during each workshop, as indicated in the schedule. Most of the materials that I give in my lectures can also be found in books, so if you systematically read the literature, you will have a good chance of writing tests successfully. The book is difficult in places, so I would suggest the following strategy:

1. Read the assigned text before each lecture.
2. Take notes during the lecture, referring to my PowerPoint lecture slides.

### Labs – 25%

The lab is an important part of this class and makes up 36% of your total class score. There will be 8 labs, the duration of each is one week. Most of the work will be done in groups, but apart from that there will be more individual work that you will have to complete yourself. If you fail to make a lab on time, you will lose 25% assigned for the lab.

#### Term tests – 25%

During the semester there will be 2 tests. These tests will be consisting of questions from past lectures and laboratory exercises. These tests can be considered as preparatory processes for the final exam. I will announce the specific coverage of each test one week before the tests, and the announcement will be posted on the classroom site. Testing will cover laboratory exercises as well as lecture material. Tests should be completed in the allotted time.

#### Final exam – 25%

The final exam is a multi-choice test based on the lecture book Structural geology. In case of academic dishonesty, you will receive zero for the job. The test and exam will cover laboratory exercises as well as lecture material. Testing should be completed at the scheduled time. Students should have colored pencils, an eraser, and a calculator with them.

### **8. EVALUATION SCHEME**

Attendance - 10%

Lectures activities - 15%

Labs - 25%

Term tests – 25%

Final exam – 25%

### **9. Grading system**

Your final grade will be determined as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
>90	86-89	82-85	78-81	74-77	70-73	66-69	62-65	58-61	54-57	50-53	<50

### **10. 2023 Spring Course Calendar – Lecture Sessions (subject to change)**

**Schedule of lecture and laboratory topics: subject to change with notice:**

## 11. EVALUATION SCHEME

Attendance - 10%

Lectures activities - 15%

Labs - 25%

Term tests – 25%

Final exam – 25%

## 12. Grading system

Your final grade will be determined as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
>90	86-89	82-85	78-81	74-77	70-73	66-69	62-65	58-61	54-57	50-53	<50

## 13. 2023 Spring Course Calendar – Lecture Sessions (subject to change)

**Schedule of lecture and laboratory topics: subject to change with notice:**

Month	Day	Lecture titles	Lab titles
January	17/19	Introduction	
January	24/26	Prospecting and the Exploration Process	Mapping principles
January/February	31/02	Geological Mapping in Exploration	Mapping principles
February	07/09	Mine Mapping	Main mapping techniques
February	14/16	Economic bases of the organization of mining	Mining Industry organization principles
February	21/23	Evaluation Techniques	Visiting of mining offices in Bishkek
February/March	28/02	Trenching in geology	Trenching study methods and trenching methods
March	07/09	Mineral Deposit Geology and Models	Core description technics
March	14/16	Origin of Soil and Grain	

March	21/23	Classification of Soil	Soil horizon structures description methods
March	28/30	Spring break	
April	04/06	Weight–Volume Relationships	Mechanical properties of soils
April	11/13	Permeability and Seepage	Outdoor class (mapping of soil outcrops)
	18/20	Soil Compaction	Outdoor class (mapping of soil outcrops)
April	25/27	Slope Stability	Landslide Overview and landslide mapping methods
May	02/04	Environment and Sustainability	Slope analysis technics
May	11	Student presentations	
<b>May</b>		<b>Final exam</b>	