Autumn 2021

**American University of Central Asia**

**Intro to Mineralogy and Petrology (AGEO-101)**

Intro to Mineralogy and Petrology (AGEO-101)

Autumn 2021 Syllabus

 **Lecturer:** Assistant Prof. Cholponbek Ormukov

Email: cholponbek76@yahoo.com

**Course schedule** Tuesday 10:50

 Thursday 10:50

**1 Course Description:**

This course is devoted to interdisciplinary coverage of the entire field of mineralogy, petrology and geochemistry. Mineralogy and petrology include a set of tools, techniques, methods and methods of human activity for studying the material composition of rocks, minerals and ores in regional geological and environmental studies, prospecting and exploration of mineral deposits, using existing and creating new technologies for the extraction, processing and application of mineral raw materials.

In mineralogy, emphasis will be placed on mineral groups that are important for the student’s research area. The mineral structure, physical properties, chemical changes, stability, and microstructures and deformation mechanisms are relevant topics. Relevant topics in petrology include processes such as weathering, diagenesis, hydrothermal change, magmatism and metamorphism

The study of mineralogy allows you to gain knowledge about the classes and groups of minerals, their physical and chemical properties, mineral formation processes, patterns of distribution in the earth's crust, as well as about their practical application.

Possession of petrology allows you to study the composition, structure, texture, nature of occurrence, the genesis of igneous and metamorphic rocks, as well as related minerals. There will be two one-day weekend trips to the Kyzyl Ompul Mountains (near Balykchy). In addition, we will visit Geological Museum at the Institute of Mining and Mining Technology (Bishkek).

Details to be announced.

**2. Course Aims:**

The purpose of this discipline is understanding the basic features of composition, structure and physical properties, conditions of formation, change and destruction, patterns of distribution in the earth's crust, as well as the practical application of natural chemical compounds - minerals and their aggregates that make up large geological bodies - rocks. Particular attention is paid to the study of minerals and rocks.

**3 Course objectives:**

The objectives of the course - the development of modern ideas about the nature of minerals and their genesis; mastering the classification of mineral species; acquisition of knowledge and professional skills in the field of recalculation of chemical compositions of minerals and their graphical representation; acquisition of skills for the description and macrodiagnostics of minerals and mineral paragenesis.

**4. Course Textbook** :

**Book 1:** Cornelis Klein & Anthony Philpotts, (2016) Earth Materials: Introduction to Mineralogy and Petrology (Second Edition), Cambridge University Press, UK, 594 pp. (the hard copy of this book is available at AUCA library) – this book will be used for

lectures

**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 labs on time, you will lose 25% assigned for the labs.

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.**  **2021 Autumn Course Calendar – Lecture Sessions (subject to change)**

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

**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.**  **2021 Autumn Course Calendar – Lecture Sessions (subject to change)**

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **Day** | **Lecture titles** | **Lab titles** |
| September | **02/07** | **Introduction to** Mineralogy and Petrology (Book 1, Chapter 1, p 38-70)**Materials of solid earth:**Definition of mineral; How are mineral classified; How are mineral named; What are crystals and rocks. (Book 1, Chapter 2, p 76-137) | Mineral properties |
| September | **09/14** | **How are minerals identified?****(**habit, color, cleavage, hardness, gravity, magnetism etc**.**) (Book 1, Chapter 3, p 146-213) | Mineral identification |
| September | **16/21** | **Fundamentals of Crystal Structures:**Naturally Occurring Chemical Elements; Atomic and Ionic Radii; Pauling’s Rules; Atomic Substitutions. (Book 1, Chapter 4, p 222-297) | Introduction to Polarized Microscope  |
| September | **23/28** | **Observing of the minerals and rocks under the Polarizing Optical Microscope:**Light and the Polarizing Microscope; The Components of the Petrographic Microscope etc. (Book 1, Chapter 6, p 432-495) | Optical identification of mineral |
| October/September | **30/05** | **Mineral properties** and rock – forming minerals (Additional materials – Earth science) | Identification of rocks in hand specimen and minerals under polarized microscope  |
| October | **07/12** | **Common minerals**The silicate minerals; The carbonate, Phosphate and Sulfate minerals.(Additional materials – Earth science) | Common mineral types |
|  |  | **Midterm exam** |  |
| October | **14/19** | **Igneous Rocks:** Occurrence, Classification & Plate Tectonics  | Travel to geological museum |
|  | **21/26** | **Igneous Rocks continue**Texture; Mineral Assemblage; Varieties, of Intrusive Igneous Rock; Varieties of Extrusive Rock. Book 1, Chapters 7-10) | Identify Igneous Minerals  |
| October/November | **28/02** | **Sedimentary Minerals and Sedimentary Rocks.**Stratification and Bedding; Clastic Sediment; Chemical Sediment; Biogenic sedimentary Rocks. Book 1, Chapters 11 p 1009-1068, Chapter, 13 p 1170-1239) | Identify sedimentary minerals |
|  |  | **Midterm exam** |  |
| November | **04/09** | **Formation,** Transportation, and Lithification of Sediment (Book 1, Chapters 12 p 1073-1162) | The sedimentary cycle |
| November | **11/16** | **Weathering,** sediment production and soils **(**Book 1, Chapter 11, 1065-1068) | Field observation of weathering process |
| November | **18/23** |  **Metamorphism** (Book 1, Chapter 14-15) | Metamorphic minerals |
| November | **25/30** | **Metamorphic Minerals and Metamorphic Rocks.**Pressure and Temperature; Textural Responses; Kinds of Metamorphic Rock Kinds of Metamorphism; (Book 1, Chapter 14 p 1248-1327 ) | Identify metamorphic Minerals |
| December | **02/07** | **Mineral Resources** (Book 1, Chapter 17 p 1528-1580) | Ore minerals |
| December | **09/14** | **Igneous rock analysis** |  |
| December | **16/21** | **Mineral Analysis** |  |
|  |  | **Final exam** |  |
|  |  |  |  |