| Course Title | Engineering Geology (4 ECTS) |
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| **Course/Module Code** | IGEOL1304 |
| Semester(s) in Which the Course Is Taught | Semesters 3 |
| Assigned Instructor | Kasimova Dilrabo, Associate Professor |
| Language of Instruction | Uzbek |
| Course Type | Compulsory |
| Study Hours (Including Independent Study) | **Total: 120 hours**<br>**Classroom instruction: 48 hours**<br>Lectures: 24 hours<br>Laboratory classes: —<br>Practical classes: 24 hours<br>**Independent study: 72 hours** |
| ECTS Credits | 4 |
| Course Aim, Objectives and Learning Outcomes | **The aim of the course** To provide students with fundamental knowledge regarding minerals, rocks, and the physical and mechanical properties, types, and classification of soils (grounds), as well as the impact of groundwater and filtration processes on geotechnical structures<br>**The objectives of the course** are to provide students with knowledge of:<br>- the content and tasks of engineering geology;<br>- physical and mechanical properties of minerals, rocks, and soils;<br>- classification and types of rocks and soils;<br>- groundwater and filtration processes;<br>- internal and external dynamic processes and their causes;<br>- geosynclines and their types;<br>-origin of tectonic movements;<br>- hydrogeology and groundwater;<br><br>Learning Outcomes:<br>1.Develops theoretical knowledge, practical skills, and independent work abilities regarding soils in students, enabling them to ensure quality, conduct quality control, analyze, and solve problems in road construction.<br><br>2.Capable of performing basic geological measurements during geological exploration and design work, while taking into account industry requirements.<br><br>3.Must possess knowledge of the current state of the industry, development prospects, and specific features of their application.<br><br>4.Must understand the operational conditions, calculation methods, and classification of physical and mechanical properties of soils.<br><br>5.Capable of evaluating the quality of materials and structures used in construction, analyzing and eliminating quality defects at geological sites, and performing quality monitoring using innovative technologies. |
| Course Content (Topics) | I. MAIN THEORETICAL PART (LECTURES)<br>**Topic 1:** Purpose, objectives, interrelation, and history of development of engineering geology.<br><br>**Topic 2:** Structure of the earth's crust, geological layers, shape of the Earth, and its geospheres. |

**Topic 3:** Origin, composition, structure, and classification of minerals and rocks.

**Topic 4:** Origin, mineralogical, and chemical composition of igneous rocks.

**Topic 5:** Sedimentary rocks: classification, conditions of formation, and construction properties.

**Topic 6:** Metamorphic rocks: construction properties and metamorphism processes.

**Topic 7:** Internal dynamic processes of the Earth, tectonic movements, and earthquakes.

**Topic 8:** External dynamic processes of the Earth (weathering, karst, suffusion, rockfalls, landslides, and avalanches).

**Topic 9:** Origin, types, physical properties, and chemical composition of groundwater.

**Topic 10:** Composition, granulometric composition, and physical-mechanical properties of soils.

**Topic 11 :** Quaternary deposits. Geological chronicle. Geological mapping and profiles. Geological maps and their types. Plotting geological data on the topographic basis of a geological cross-section.

**Topic 12:** Engineering-geological survey works. Engineering-geological survey works. Study of the geological structure of the construction site, soil properties, and groundwater.

II. GUIDELINES AND RECOMMENDATIONS FOR LABORATORY CLASSES

Laboratory classes are not included in the curriculum.

III. GUIDELINES AND RECOMMENDATIONS FOR PRACTICAL CLASSES

Preparation for practical classes begins with the instructor's review of the initial documents (curriculum, thematic plan, etc.) and concludes with the preparation of a lesson plan.

Recommended practical topics:

1. Familiarization with the physical properties of rock-forming minerals.
2. Study of the crystal structures of minerals.
3. Study of engineering-geological properties of igneous rocks.
4. Study of engineering-geological properties of metamorphic rocks
5. Study of engineering-geological properties of sedimentary rocks.
6. Engineering-geological properties of Quaternary deposits.
7. Compilation of a groundwater distribution map for hydrogeological zoning.
8. Determination of physical properties of soils through calculation methods.
9. Granulometric composition and properties of soils.
10. Mechanical properties of soils.
11. Determination of water in soils and its bonding forms.
12. Processing of engineering-geological survey materials and report preparation

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| | **IV. INDEPENDENT STUDY AND SELF-DIRECTED WORK**<br>Independent learning helps students develop the ability to improve themselves independently and contributes to increasing the effectiveness of their professional activities. Students complete independent assignments on their mobile devices, under the instructor's guidance, either in traditional or electronic format.<br>Recommended topics for independent study:<br>1. The great contribution of Uzbek scientists to the development of engineering geology.<br>2.Main forms and types of relief.<br>3.Jointing of rock masses and their classification.<br>4.Types of water in soils, their classification and description.<br>5.Mechanical properties of soils.<br>6.Groundwater and its formation.<br>7.Regime of groundwater and their representation on hydrogeological maps and cross-sections.<br>8.Classification of Quaternary deposits.<br>9.Loess and loess-like rocks and their properties.<br>10.Geological maps and conventional signs (symbols).<br>11.Determination of hydrogeological conditions of the site.<br>12.Compilation of groundwater zoning maps for hydrogeological regionalization.<br>13.Engineering-geological survey works.<br>14.Independent laboratory works and analysis of results.<br>15.Engineering-geological characteristics of Quaternary deposits. |
| Student Assessment | Student assessment is based on the level of mastery of the learning materials during the semester and final assessment, as demonstrated through tests, assignments, and written and oral work.<br>Throughout the course "Assessment of the Technical Condition of Buildings and Structures," students are assessed on a 100-point scale. Of these, 50 points are allocated to current and midterm assessment (60% of these 50 points for ongoing assessment and independent study, and 40% for midterm assessment), while the remaining 50 points are allocated to the final assessment. Students whose combined current and midterm assessment score is below 30 points are not admitted to the final examination. A student who scores 30 points or more in the final assessment is considered to have successfully completed the course. |
| Examination Requirements | Students must fully master the theoretical and practical concepts covered in the topics and be able to present the results of their analyses accurately. Students must complete the assignments given for independent work and the current and midterm assessment components. They must also obtain the required number of points in current assessment, midterm assessment, independent study and final assessment for the course within the specified period.<br>A student who fails to submit current assessment, midterm assessment or independent study assignments, or who scores fewer than 30 points for these assignments and assessment components, is not admitted to the final assessment.<br>Furthermore, a student who is absent without a valid reason for 25% or more of the classroom hours allocated to the course will be withdrawn from the course, will not be admitted to the final examination, and will be considered not to have earned the relevant credits for the course.<br>A student who fails the final examination or scores between "0 and 29.9" in this examination is considered to have an academic debt. |

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| Recommended Literature | 1.Kasimova D. P. *Injenerlik geologiyasi* (Engineering Geology). Textbook. – T.: Uzbekistan, 2024. – 204 p.<br>2. Zafarov O. *Geotexnika muhandisligi* (Geotechnical Engineering). Textbook. – T.: Tashkent Publishing, 2026. – 260 p.<br>3.Rasulov H. Z. *Gruntlar mexanikasi, zamin va poydevorlar* (Soil Mechanics, Subgrades, and Foundations). Textbook. – T.: Tafakkur 2nd Edition, 2017. – 342 p.<br>4.Kasimova D. P. *Injenerlik geologiyasidan amaliy mashg'ulotlar* (Practical Classes in Engineering Geology). Study guide. – Tashkent, 2021. – 157 p.<br>5. Kayumov A. D. *Geologiya va gruntshunoslik* (Geology and Soil Science). Textbook. – Tashkent, 2016. – 169 p.<br>6. *International Journal of Geotechnical Engineering*, Elsevier, 2022.<br>7. *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 2022.<br>8. Geoengineer.org – Collection of geotechnical engineering resources and practical issues.<br>9. https://my.gov.uz/oz – Official website of the Unified Interactive State Services Portal of the Republic of Uzbekistan. |