

UNIVERSITY OF KERALA

**FIRST DEGREE PROGRAMME IN
GEOLOGY
UNDER CHOICE BASED
CREDIT AND SEMESTER SYSTEM
(CBCSS)**

**OUTCOME BASED
SCHEME AND SYLLABUS
(2020 ADMISSION ONWARDS)**

GEOLOGY AS COMPLEMENTARY COURSE FOR GEOGRAPHY

THEORY

Semester No.	Code No. and Name of Paper	Total Hours	Credits
I	GL 1131 – Physical Geology	36	2
II	GL 1231 – Geomorphology and Mineralogy	36	2
III	GL 1331 – Petrology and Structural Geology	54	3
IV	GL 1431 – Stratigraphy, Palaeontology and Economic Geology	54	3

PRACTICAL

Semester No.	Code No. and Name of Paper	Total Hours	Credits
IV	GL 1432 – Geology Practical	36	4

First Semester B.Sc. Geography Syllabus of Complementary Course – I

Semester	Hours/Week	Hours/ Semester	Exam	Mark			Credits
				Internal	External	Total	
I	2 Hours	36 Hours	3 Hours	20	80	100	2

COURSE OUTCOMES

- CO 1: Understand and describe the basic facts of the earth, its age and the Geological Time Scale; explain the different processes operating on the earth and within the earth.
- CO 2: Understand and explain weathering as an earth process, its agents, types and products; describe soil formation, typical soil profile and soil types of India.
- CO 3: Understand and describe mountains, their types; and the concepts of orogeny and isostasy; explain mass movements, their types, causes and effects of landslides.
- CO 4: Understand and describe groundwater as a geological agent with reference to its origin, occurrence, types of aquifers, springs, recharge of groundwater, types of wells and geological action.

SYLLABUS

GL 1131: GEOLOGY I: PHYSICAL GEOLOGY

Unit-I Geology – an introduction. The earth - its dimensions, age and internal structure, Relative age and absolute age of the earth. Concept of Geological Time Scale.

(6 Hours)

Unit-II Processes in Geology - agents, energy, and classification; Endogenic processes and Exogenic processes. The Rock cycle, and the three rock types, Plate tectonics, palaeomagnetism, sea floor spreading.

(6 Hours)

Unit-III Weathering – agents, types and products. Physical weathering and chemical weathering. Influence of climate and lithology on soil formation. Soils - their formation, types in India and a typical tropical soil profile. **(7 Hours)**

Unit-IV Mountains – types; Fold mountains, Fault/Block mountains and Volcanic mountains. Orogeny, Isostasy. **(5 Hours)**

Unit-V Mass movements – different types and their classification. Causes and effects of Landslides. **(5 Hours)**

Unit-VI Groundwater and its sources. Sources of groundwater. Hydrologic cycle. Subsurface occurrence of groundwater. Aquifer, aquiclude, aquitard, aquifuge - types of aquifers - confined and unconfined and artesian aquifers - springs, Recharge and discharge of groundwater - different types of wells. Geological work of groundwater.

(7 Hours)

Second Semester B.Sc. Geography Syllabus of Complementary Course – II

Semester	Hours/Week	Hours/ Semester	Exam	Mark			Credits
				Internal	External	Total	
II	2 Hours	36 Hours	3 Hours				2
				20	80	100	

GL 1231: GEOLOGY II: GEOMORPHOLOGY AND MINERALOGY

COURSE OUTCOMES

- CO 1: Understand and describe different aspects of streams, their geological actions, landforms produced and the concepts of graded stream and base level of erosion.
- CO 2: Understand and describe glaciers and oceans and seas as agents of geological action and the landforms produced.
- CO 3: Understand and explain volcanoes and earthquakes, seismic belts of the world and illustrate the interior of the earth.
- CO 4: Understand and describe minerals and crystals; explain the physical properties of minerals; and describe the chemical composition and physical properties important minerals.

SYLLABUS

GL 1231: GEOLOGY II: GEOMORPHOLOGY AND MINERALOGY

Unit-I Streams – overland flow, channel flow, types of streams, drainage basin, patterns. Geological work of streams - erosion, transportation, deposition - types of loads - long profile of stream - graded stream. Concept of base level - fluvial aggradational and degradational landforms. **(6 Hours)**

Unit-II Glaciers – types, distribution, geological work- glacial landforms, moraines. Wind - geological action of wind - Aeolian landforms. Oceans and seas - geological activity of ocean and sea waves. Sea level changes and their causes. Submarine topography, coral reefs, coastal landforms - marine sediments. **(7 Hours)**

Unit-III Volcanoes - mechanism, types, products. Distribution of volcanoes, volcanic

landforms. Earthquakes - causes, types, seismic waves, epicenter, focus, isoseismal lines, intensity and magnitude, seismic belts. Interior of the earth. **(7 Hours)**

Unit-IV Minerals and crystals - study of crystals and its significance in mineral identification; morphology of crystals; scope and aim of mineralogy, rock forming minerals and ore forming minerals, examples. **(5 Hours)**

Unit-V Physical properties of minerals - colour, streak, lusture, transparency, fracture, cleavage, hardness, specific gravity, magnetism. **(5 Hours)**

Unit-VI Chemical composition and diagnostic properties of the following minerals - Quartz, Feldspar, Biotite, Muscovite, Hornblende, Calcite, Garnet, Hematite, Gypsum, Kyanite, Sillimanite, Magnetite, Chromite, Pyrite, Chalcopyrite, Apatite, Actionolite, Beryl, Magnesite, Fluorite, Talc, Pyrolusite, Galena, Dolomite, Corundum, Graphite, Sphalerite, Diamond, Coal, Asbestos, Monazite, Bauxite. **(6 Hours)**

Third Semester B.Sc. Geography Syllabus of Complementary Course – III

Semester	Hours/Week	Hours/ Semester	Exam	Mark			Credits
				Internal	External	Total	
III	2 Hours	36 Hours	3 Hours	20	80	100	2

GL 1331: GEOLOGY III: PETROLOGY AND STRUCTURAL GEOLOGY

COURSE OUTCOMES

- CO 1: Understand and describe magma as source of igneous rocks; describe the texture, mode of occurrence and classification of igneous rocks and the megascopic properties of important igneous rocks.
- CO 2: Understand and describe sedimentary rocks, their textural and structural features, types of sedimentary rocks and megascopic properties of important sedimentary rocks; understand metamorphism and metamorphic rocks, their formation, factors of formation, textures and megascopic properties of important metamorphic rocks.
- CO 3: Understand and explain the different aspects of topographical maps and geological maps; structural features and attitudes of rocks and geological significance.
- CO 4: Understand and describe folds, faults and joints with reference to geometrical elements, types and geological significance and explain foliations and lineations.

SYLLABUS

GL 1331: GEOLOGY III: PETROLOGY AND STRUCTURAL GEOLOGY

Unit-I Magma - physical and chemical properties, lava and its types. Igneous rocks - texture, mode of occurrence - dykes, sills, laccolith, lopolith, stock, batholith, phacolith. Classification of igneous rocks - megascopic studies of igneous rock types - granite, pegmatite, rhyolite, dunite, dolerite, pumice, syenite, gabbro, diorite, basalt.

(6 Hours)

Unit-II Brief study of sediments and sedimentary rocks. Structural and textural features -

field classification. Megascopic study of the following sedimentary rocks - sandstone, shale, limestone, conglomerate, breccia, laterite. **(6 Hours)**

Unit-III Metamorphism - types and factors. Texture of metamorphic rocks. Megascopic study of the following metamorphic rocks - phyllite, slate, schist, gneiss, quartzite, marble, granulite, charnockite, khondalite. **(6 Hours)**

Unit-IV Topographical maps and geological maps - their preparation, conventional symbols. Structural features controlling landform development. Outcrops, strike and dip of the surfaces, primary and secondary structures, unconformities and their geological significances. **(6 Hours)**

Unit-V Fold, geometrical elements – geometrical classification, brief study of the following – antiform, synform, anticline, syncline, isoclinal fold, recumbent fold, overturned fold, geanticline, geosyncline, anti and synclinorium **(6 Hours)**

Unit-VI Faults – terminologies, type, study of the following – normal, reverse, strike slip and dip slip faults, horst, graben, rift valley. Joint- types and geological significance, Foliation and lineation. **(6 Hours)**

Fourth Semester B.Sc. Geography Syllabus of Complementary Course – IV

Semester	Hours/Week	Hours/ Semester	Exam	Mark			Credits
				Internal	External	Total	
IV	2 Hours	36 Hours	3 Hours				2
				20	80	100	

GL 1431: GEOLOGY IV: STRATIGRAPHY, PALEONTOLOGY AND ECONOMIC GEOLOGY

COURSE OUTCOMES

- CO 1: Understand and describe the basic ideas and principles of stratigraphy, the Geological Time Scale and the units; understand and explain the major geological divisions of India and stratigraphy of Kerala.
- CO 2: Understand and describe Palaeontology, fossils, fossilization, uses of fossils and morphological features of important fossils.
- CO 3: Understand the subject matter of Economic Geology and describe the various processes of ore formation and the ore deposits produced.
- CO 4: Understand and describe the mode of occurrence, geographic location in India and Geology of some important mineral deposits including coal and petroleum.

SYLLABUS

GL 1431: GEOLOGY IV: STRATIGRAPHY, PALEONTOLOGY AND ECONOMIC GEOLOGY

Unit-I Stratigraphy – its contents, basic principles, uniformitarianism, super position, lateral continuity, original horizontality, faunal succession, faunal assemblage. Geological time scale and basic time units – Eon, Era, Period, Epoch. **(6 Hours)**

- Unit-II** Major geological divisions of India – Brief study of stratigraphy of Kerala, Pre-Cambrian, Tertiary and Quaternary formations. **(6 Hours)**
- Unit-III** Paleontology – its branches, fossils, types of fossilization and uses of fossils. General morphological features of Brachiopods, Pelecypods, Gastropod and Arthropod. **(6 Hours)**
- Unit-IV** Economic Geology – Ore, gangue and industrial minerals. Brief study of important process of ore mineral formation. **(6 Hours)**
- Unit-V** Magmatism, hydrothermal processes, volcanism, contact metasomatism, metamorphism, evaporates, residual and mechanical concentration, supergene and sulphide enrichment. **(6 Hours)**
- Unit-VI** Mode of occurrence, geographic location in India and geology of the following mineral deposits. Iron – Kudremukh, Karnataka, Lead and Zinc – Zawar, Rajasthan, Gold – Kolar, Karnataka, Mica – Nellore, Andhra Pradesh, Manganese – Chindwara, Madhya Pradesh, Copper – Khetri, Rajasthan, Aluminium – Koraput, Orissa, Lignite – Neyveli, Tamilnadu, Coal – Bokaro, Jharkhand, Petroleum – Naharkotiya, Assam and Bombay. **(6 Hours)**

PRACTICALS

First Semester B.Sc. Geography

Semester	Hours/Week	Hours/ Semester	Exam	Mark			Credits
				Internal	External	Total	
I, II, III & IV	2 Hours	36 Hours	Exam in IV Sem.	20	80	100	4

(Note: Practical sessions in First, Second, Third and Fourth semesters; Practical examination in Fourth semester)

COURSE OUTCOMES

- CO 1: Understand, illustrate and draw diagrams related to rock cycle, hydrological cycle, subsurface groundwater occurrence, aquifer types and soil profile.
- CO 2: Identify topographic and drainage features in topographic maps; identify megascopically rock forming and ore minerals by listing their salient properties.
- CO 3: Prepare charts and diagrams of classification of rocks, block diagrams of structural features; work out simple problems in topographic maps, and determine attitude of beds from structural maps and interpret simple geological maps.
- CO 4: Prepare chart of Geological Time Scale; prepare Mineral map of Kerala, Map of India showing locations of important mineral deposits and Geological map of Kerala; draw diagrams of simple fossils and identify megascopically common rocks.

GL 1432: Syllabus of Complementary Course – Practical I

Zero Credits 36 hours

- I. Preparation of diagrams of the following - rock cycle, hydrological cycle, subsurface groundwater occurrence, confined, unconfined and artesian aquifers.
- II. Preparation of diagram of typical soil profile.

Second Semester B.Sc. Geography

GL 1432: Syllabus of Complementary Course – Practical II **Zero Credits** **36 hours**

- I. Exercises in identification of salient topographic and drainage features using topographic maps. 1:50000 or 1:25000 Survey of India Toposheets.
- II. Megascopic identification of rock forming minerals and ore minerals listed in the theory part of the syllabus.

Third Semester B.Sc. Geography

GL 1432: Syllabus of Complementary Course – Practical III **Zero Credits** **36 hours**

- I. Preparation of chart showing classification of igneous, metamorphic, and sedimentary rocks.
- II. Block diagrams of the following: Fold - anticline, syncline, recumbent fold. Fault - normal, reverse, dip slip, strike slip, graben, horst. Unconformity - angular, disconformity, non-conformity. Joints, dykes, sills, laccolith, lopolith, batholith, phaccolith.
- III. Measurement of slope and distance in topographic maps. Determination of strike and dip of formations from maps. Interpretation of geological maps with simple structures. (fold, fault, unconformity)

Fourth Semester B.Sc. Geography

GL 1432: Syllabus of Complementary Course – Practical IV **Four Credits** **36 hours**

- I. Preparation of chart of Geological Time Scale, Mineral map of Kerala, Map of India showing locations of important mineral deposits mentioned in the theory syllabus.
- II. Geological map of Kerala showing distribution of major stratigraphic units.
- III. Diagram of a shell of a typical brachiopod, pelecypod, gastropod, ammonite and trilobite.
- IV. Megascopic identification of rocks listed in the theory part of the concerned units.

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- Chris Pellant and Helen Pellant (2007) Fossils: A Photographic Field Guide New Holland Publishers.
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