

UNDERGRADUATE PROGRAMME COURSE OUTCOME

Name of the Programme: B.Sc. Geology

Name of the Class	Course Code	Course Title	Course Outcome	
SEMESTER I				
F.Y.B.Sc.	GL 111	Fundamentals of Geology and Understanding the Planet Earth	CO1	The study of this paper strengthens student knowledge with respect to understanding the essentials of the structural dynamics of the earth.
			CO2	Students will understand the nomenclature of Earth.
			CO3	Students will be able to understand the historical nature of the earth.
			CO4	Students will distinct the various Geological processes that take place on the surface of the Earth.
	GL 112	Mineralogy and Crystallography	CO1	Studying the basics of mineralogy and crystallography helps in understanding and building the overall knowledge in Geology.
			CO2	Students will learn the scope and branches of mineralogy, its importance and conservation.
			CO3	Student will learn major elements constituents of minerals, their formation in different environment.
			CO4	Students will be able to identify minerals and ore mineral, and will be able to diagnose the characters of the minerals and its uses.
	GL 113	Practicals related to GL 111 and GL 112	CO1	Students will be able to identify different minerals based on their physical properties.
			CO2	Students will be able to identify different minerals based on their Optical properties using Petrological microscope.

			CO3	Student will be able study the Nomenclature of different crystals based on their crystallographic systems of formation.
			CO4	Students will study the concepts of Geological maps, with reference to their Topography, Geology and Geological History.
SEMESTER II				
F.Y.B.Sc	GL 121	Stratigraphy and Sedimentation	CO1	The student will learn the Principles of Strtigraphy,development of Stratigraphic concepts and its importance.
			CO2	The student will study the stratigraphic classification, Nomenclature and stratigraphic elements. And methods of collection Stratigraphic data
			CO3	Student will learn the processes of Sedimentation and formation of Sedimentary rocks
			CO4	The student will study the Textures and Structures of the sedimentary rocks and its importance to its environment of formation.
	GL 122	Petrology and Geochemistry	CO1	Student will study the definition and characteristics of different rocks.
			CO2	Student will learn the nature, physicochemical composition of the Magma.
			CO3	Student study the process of Crystallization of Magma and the factor controlling crystallization.
			CO4	Student will study the different Textures and Structures of Igneous rocks.
			CO5	Students will study the various theories related to formation of Elements and basic terms of Radioactivity.
			CO6	Student will study the Definition, Agents and types of Metamorphism along with concept of Metamorphic Facies.
			CO7	Student will study the different Textures and Structures of Metamorphic rocks.

	GL 123	Practicals related to GL 121 and GL 122	CO1	The student will study the Megascopic and Microscopic properties of Igneous, Sedimentary and Metamorphic rock with their classification.
			CO2	The student will study the primary sedimentary structures and their environmental significance
			CO3	The student will study the Principles of stratigraphic correlation
			CO4	The students will undertake one day geological field work and submit the tour report
SEMESTER III				
S.Y.B.Sc	GL 211	Structural Geology	CO1	The students will study the attitude of planar feature and the use of Brunton Compasses, Clinometer Compasses, and GPS.
			CO2	The student will study the factors controlling the rock deformation.
			CO3	The student will study the definition, terms, and the classification of various structural features such as Joints, Fractures, Shear zones, Faults and Folds.
	GL 212	Palaeontology	CO1	The Student will study Definition, Branches, Importance and Scope of Paleontology.
			CO2	The Student will study the Definition, modes of Presevation of fossil and techniques used in collection, and illustration of fossils.
			CO3	The study will study the morphology of Hard parts ,Geological and Geographical distribution of Phylla Mollusca, Coelenterate, Echinodermata and Arthropoda
			CO4	The student will student organic evolution.
	GL 213	Practicals related to GL 211 and GL 212	CO1	The students will study the principles involving solving of Geological maps.
CO2			The students will study the Structural Problems involving hill slopes, True thickness, Apparent thickness, Vertical thickness and width of outcrop.	

			CO3	The students will study the Structural Problems involving the True dip and Apparent dip.
			CO4	The students will study the Structural Problems involving the three point problems.
			CO5	The students will learn the various Fossils based on their morphology of Hard parts, Geological and Geographical distribution of Phylla Mollusca, Coelenterate, Echinodermata and Arthropoda.
SEMESTER IV				
S.Y.B.Sc	GL-221	Global Tectonics and Geodynamics of the lithosphere	CO1	The students will learn Evolution of earth based on Composition, physical properties & characteristics of three spherical zones.
			CO2	The students will study the Structure of the lithosphere.
			CO3	The students will study the Global Tectonics of the earth.
			CO4	The students will study the terminologies associated with Different tectonic settings of the earth.
	GL-222	Environmental Geology and Geogenic disasters	CO1	The students will study the Concepts, Objectives, and Scope of Environmental Geology; Physical, Biological, and Socio-geological Environment, Bio-geochemical cycles
			CO2	The students will study Surface and subsurface water resources, Hydrogeologic cycle and sources of water Pollution.
			CO3	The students will study different kind of Pollution; Organic And inorganic, Air Pollution and the remedial measures.
			CO4	The student will study the Definition, Types, Prediction, Natural hazard zones and impact assessment.
			CO5	The students will study the Geogenic Disaster such as Volcanoes, Cyclones, Floods and Landslides.
	GL-223	Practicals related to GL 221 and	CO1	The students will study Marking of Craton/ Mobile belts/ Platforms/ Sedimentary Basins.

		222	CO2	The students will solve problems related to P and S waves (Interior of the Earth) and Geotherm/Isostasy.
			CO3	The students will solve Problems related to Water Quality index, Air Quality Analysis, Slope stability analysis.
			CO4	The students will undertake a one day geological field work and submit the tour report
SEMESTER V				
T.Y.B.Sc	GL 311	Geology of India – I	CO1	The students will learn the Indian sub-continent exposes a wide range of lithologies that span from 3.6 billion years to present.
			CO2	The students will learn the Geology of India is synonymous with the geology of the world and its ancient rock types from the Indian Peninsula,
			CO3	The students will learn the Cretaceous Deccan volcanism and Tethyan sediments exposed in the mighty Himalayas is noteworthy.
			CO4	The student will gain the knowledge about the stratigraphy and geology of India with emphasis on the Stratigraphy of India with respect to Paleozoic, Mesozoic and Cenozoic Era which will help in understanding the different episodes on the earth during the geologic past.
			CO5	The students will learn the State related Geology: The Geology and Stratigraphy of Maharashtra
	GL 312	Mineral Resources	CO1	The students will learn essential and basic concepts of mineral expiration techniques and the art and science of mining mineral resources.
			CO2	The students will learn Primary processes of formation of Mineral Deposits
			CO3	The students will learn Secondary processes of formation of mineral deposits
			CO4	The students will learn metallic deposits with reference to mineralogy, properties, uses & their geological & geographical

				distribution
			CO5	The students will learn non-metallic deposits with reference to mineralogy, properties, uses & their geological & geographical distribution
			CO6	The students will learn Geophysical and Geochemical methods for mineral exploration
			CO7	The students will learn Environmental and social issues related to mineral resource extraction
	GL 313	Marine Geology	CO1	A student will understand and learn about the basic concepts of oceanography and marine geology with respect to geology as to enable them to work as a marine researcher.
			CO2	The students will learn applications of Geophysical Techniques for Exploration of the Sea Floor
			CO3	The students will learn about an Exclusive economic zone (EEZ) and their economic potential
			CO4	The students will learn Origin, structure and evolution of Indian Ocean shelf and margins
			CO5	The students will learn Marine Environmental Problems Associated with Non-Petroleum
	GL 314	Engineering Geology	CO1	The student will become aware of the importance of geological studies and its applicability to various engineering problems.
			CO2	The students will learn Engineering Properties of Construction Material
			CO3	The students will learn Site investigations for dam,tunnel,roads and bridges
	GL 315	Hydrogeology	CO1	The students will learn basic concepts in Hydrogeology
			CO2	The students will learn field and laboratory methods used to characterize aquifer properties and hydrogeology of rocks
			CO3	The students will learn Groundwater chemistry, Groundwater

				Resources of India.
			CO4	The students will learn Groundwater quality hotspots in India
			CO5	The student will understand the hydrogeological concepts, exploration, exploitation and recharge of groundwater and methods of monitoring groundwater quality and sources of pollution
	GL 316	Applied Geophysics	CO1	This course deals with methodologies for extracting ecological information out of geophysical datasets generated from different petrophysical properties.
			CO2	The student will learn Geophysical Methods like Gravity Method, Magnetic Method, Seismic Method
			CO3	The student will learn Geophysical Methods like Electrical Method, Resistivity Method, Self-potential Method, Induced polarization Method and Electromagnetic Method
			CO4	In Geophysical exploration the student will gain first-hand knowledge dealing with the principles and their significance
	SEC-I	Geotechnology	CO1	The student will learn about the concepts, methods and hands on determination of soil and rock properties which will strength their knowledge of Engineering Geology.
			CO2	The student will learn about the basic knowledge of surveying techniques.
			CO3	The student will learn about the Geotechnical Studies related to Drilling in geotechnical field and Drilling Equipments
			CO4	The student will learn about the Laboratory and Field Geotechnical Tests
			CO5	The student will learn about the Surveying and Levelling related to definitions of Surveying and Levelling and Objectives of Survey
	SEC-II	Gemmology and Gem Testing	CO1	The student will learn about the Gemmology- Basic properties of gems- Formation of gem stones

			CO2	The student will learn Uses of Gem Testing Instruments,
			CO3	The student will learn the causes of colours in gem stones and treatments of gem stones and their detection
			CO4	The student will learn Measurement of refractive indices and birefringence tests using a gem-testing Refractometer).
			CO5	The student will learn the basic idea is to make students well versed with the different terminologies used in the gem industry and to provide skills to become a successful gemmologist
	GL 317	Practicals related to GL 311 and GL 312	CO1	The student will learn typical hand specimens of rocks from different lithological units of Pre Cambrians of India.
			CO2	The student will learn paleogeographical maps of different periods of Pre Cambrians of India.
			CO3	The student will learn geological maps of different units of Pre Cambrians of India and Interpretation of regional geological maps.
			CO4	The student will learn ore minerals in hand specimen and industrial minerals in hand specimen
			CO5	The student will learn preparation of mineral maps of India showing occurrences of Ore and industrial minerals.
			CO6	The student will learn Mineralogical & textural study of common Ore minerals/industrial minerals under microscope.
	GL 318	Practicals related to GL 313 and GL 314	CO1	The students will study rocks of ocean floor and Plotting of distribution of major bathymetric and tectonic features in the global oceans
			CO2	The students will study authigenic sediments and Distribution and plotting of carbonate and siliceous oozes, glacio-marine, pelagic clay and volcanogenic sediments in global oceans
			CO3	The students will study Preparation of section along mentioned directions and interpretation for construction of dam, tunnel and bridge
			CO4	The students will study of physical and engineering properties of aggregates and building stone
	GL 319	Practicals related to GL 315 and	CO1	The student will have gained an understanding of hydrogeological concepts, exploration, exploitation and recharge of groundwater

		GL 316		and methods of monitoring groundwater quality and sources of pollution
			CO2	The students will study preparation and interpretations of hydrographs from given water level data and water table contour maps from given water level data.
			CO3	The students will study estimation of aquifer properties as porosity and permeability, hydraulic conductivity. Storage coefficient and Transmissivity.
			CO4	The students will study of patterns of geophysical responses from various geological mediums.
			CO5	The students will study maps related to Gravity and Magnetic anomalies and Interpretation of Seismic Data
			CO6	The students will study plotting and interpretation of resistivity data as well as Analysis of self-potential data.
SEMESTER VI				
T.Y.B.Sc	GL 321	Geology of India – II	CO1	The students will study the students will study Stratigraphic Boundaries in India –Archean- Proterozoic, Precambrian-Cambrian, Permo- Triassic, K-T
			CO2	The students will study Geological systems with reference to their type area, broad lithology, fossils content Cambrian, Ordovician, Silurian, Devonian, Carboniferous, Permian, Triassic, Jurassic, Cretaceous & Tertiary
			CO3	The students will study brief account of their distribution, Geographical location, classification lithological succession, structure and economic importance, with a broad range stratigraphic correlation- Palaeozoic Era
			CO4	The students will study in brief account of their distribution, Geographical location, classification lithological succession, structure and economic importance, with a broad range stratigraphic correlation- Mesozoic and Cenozoic Era
			CO5	The students will study physiographic divisions and tectono-magmatic evolution, Stratigraphy and tectonics of the Siwaliks, Karewas of Kashmir and the Trans-Himalayan and Karakoram Granite Batholith

			CO6	The students will study State related Geology: The Geology and Stratigraphy of Maharashtra
	GL 322	Mining and Mineral Exploration	CO1	The students will study Geology in mining industry,
			CO2	The students will study Mineral exploration, Surface and sub-surface exploration methods. prospecting for economic minerals – drilling, sampling and assaying, Geophysical techniques Geomorphological and remote sensing techniques, Geobotanical and geochemical methods
			CO3	The students will study types of mining-Surface and underground mining, Equipment and accessories for mining, Calculation of Specific gravity, Porosity, Bulk density, compression factor
			CO4	The students will study sampling Principle, Methods, Size and quantity, Reduction, Errors, Sampling practices in open-cast mining
			CO5	The students will study types of Open cast mining, Underground mining, Coal mining methods Factors influencing choice of mining method
			CO6	The students will study Mining Acts and Regulations in India and Conservation of mineral resources
			GL 323	Oceanography
	CO2	The students will study Physical oceanography		
	CO3	The students will study Ocean currents-, Origin of surface currents, Main Components of Ocean Surface Circulation, Indian Ocean Circulation		
	CO4	The students will study El-Nino effect relation between climate and ocean in the Indian context		
	CO5	The students will study Sea level changes -Processes Affecting Sea		

				Level, Past Sea Level Changes & Effects
			CO6	The students will study Coastal Regulatory Zones - Classification & Prohibited activities within CRZ & Regulation of permissible activities in CRZ
	GL 324	Petroleum Geology	CO1	A student will understand and learn about the basic concepts of Petroleum Geology with respect to geology as to enable them to work as a Petroleum Geologist.
			CO2	The students will learn Origin of petroleum, Kerogen: Source Material and Formation, Composition and Distribution Petroleum Chemical composition and physical properties of crudes oil
			CO3	The students will learn Reservoir fluids: Water, oil and gas, origin, migration and accumulation of oil and natural gas
			CO4	The students will learn Reservoir and Traps
			CO5	The students will learn Petroliferous Basins of World
			CO6	The students will study Petroliferous Basins of India, Bombay basin; Krishna-Godavari basin; Assam basin; Cauvery basin and Rajasthan basin
	GL 325	Climate Change: Past, Present and Future	CO1	The students will learn the Earth's climate system and explores the science of global climate change using different proxies.
			CO2	The students will learn composition and structure of the atmosphere, Study climate change models
			CO3	The students will learn the factors affecting the earth's climate will be examined, along with anthropogenic impacts both globally and regionally
			CO4	The students will learn Effects on climate change, Greenhouse gases, El Nino and Ocean circulation
			CO5	The students will learn the changes in rainfall patterns/intensity vis-à-v is storm surges, cyclone, floods, droughts
			CO6	The students will learn the evolution of Indian monsoon system through the geological time, agro-climatic divisions of Indian subcontinent, climate and landscape evolution, Use of climate

				proxies to model and monitor past and present climate indicators
GL 326	Geological Field Methods and Mapping	CO1	This course is devised to provide basic knowledge of geological mapping and surveying techniques. It also will upgrade and relate the theoretical knowledge of geological aspects to field observations.	
		CO2	The students will learn Introduction to the study of geological field methods and mapping, use and applications of Brunton, Clinometer Compass and GPS in fieldwork	
		CO3	The students will learn Reconnaissance study of areas having igneous and metamorphic and sedimentary rocks, Locating oneself on topographic map, Identification, discrimination and tracing of different type of contacts, Geological mapping of a small area, collection, identification and labelling of rock and mineral specimens.	
		CO4	The students will learn Students will make geological observations in the field, record data in field notes, and prepare geological maps, field safety, Logistics and Navigation	
		CO5	The students will learn Toposheet reading of toposheet with reference to toposheet number, latitude, longitude, state, district, scale, adjacent toposheet numbers and conventional signs. Orientation of Topographic sheet in field; marking location in toposheet; Bearing	
		CO6	The students will learn the Interpretation of geological data and maps, and communicating geological information:	
SEC-III	Applications of Remote Sensing in Geosciences	CO1	The student will be appraised with all the theoretical knowledge, information and skills to use Remotely Sensed data for geological applications.	
		CO2	The students will learn different types of Remote sensing Systems (Active & Passive), Elements of passive Remote sensing system.	
		CO3	The students will learn Energy source and radiation principles (EM wave, Wave theory, EM spectrum, particle theory, Stefan-Boltzman's law, Emissivity, Black, white & grey bodies)	

			CO4	The students will learn Energy interactions in the atmosphere (Scattering, absorption, atmospheric windows & related sensing systems); Energy interactions with the earth (principles of the Conservation of energy, specular & diffused reflectors), Spectral reflectance of vegetation, soil & water; Data acquisition & interpretation.
			CO5	The students will learn aerial photography-classification of aerial photographs on the basis of Camera axis, Film and filter combination, lens -system, types of cameras, high and low sun angle photography, digital cameras, Planning of Aerial photography-Time of photography, Geometric characteristics of Aerial photos, Mirror and pocket stereoscopes.
			CO6	The students will learn Photo Recognition Elements, Photo-geological interpretations, Introduction to Satellites, Sensors & their applications, Scanners, Image characteristics & Spectral responses of various features, Applications of Remote sensing
	SEC-IV	Oil Field Services	CO1	The students will learn Types oil wells and geotechnical order Methods of Oil well drilling: Cable tool drilling and rotary drilling
			CO2	The students will learn Components of rotary drilling system Monitoring of drilling process Concept of Subsurface pressure
			CO3	The students will learn Types of Drilling Rigs, Controlled Directional Rotary Drilling and Horizontal Drilling, Drilling Mud
			CO4	The students will learn Formation Evaluation, : Wire line logs, Basic Principles , tools of SP, gamma ray, Neutron, Density, Caliper, Dipmeter, Temperature and Sonic Logs and their interpretation
			CO5	The students will learn Mud logging: Principle, techniques and tools of mud logging. Interpretation of gas, drilling and mud parameters.
			CO6	The students will learn MWD(Measurement While Drilling)/LWD (Logging While Drilling) . Principle and tools of MWD/LWD, data analysis and interpretation,

	GL 327	Practicals related to GL 321 and GL 322	CO1	The students will learn typical hand specimens of rocks from different lithological units of Phanerozoic of India. Gondwana Supergroup, Jurassics of Kachchh and Rajasthan, Cretaceous of Narmada Valley/Bagh beds, Cretaceous of Tamil Nadu and Meghalaya, Deccan Volcanic province, Tertiary and Quaternary formations of India
			CO2	The students will learn Study of paleogeographical maps of different periods of Phanerozoic of India.
			CO3	The students will learn Geological maps of different units of Phanerozoic of India, Interpretation of regional geological maps, learn Gondwana flora
			CO4	The students will learn Calculation of Specific gravity, Porosity, Bulk density, averages of assay values
			CO5	The students will Correlation of subsurface data from different logs and Calculation of ore reserves from the given map data.
	GL 328	Practicals related to GL 323 and GL 324	CO1	The students will learn reading coastal toposheets, hydrographic sheets and ocean floor topography and Preparing bathymetric cross-sections using hydrographic sheets
			CO2	The students will learn Assigning different kinds of marine sediments to different bathymetric settings, Study of important global surface and deep-water currents, with special emphasis on the 'Conveyor Belt'
			CO3	The students will learn Distribution of Global Pressure belts and Determination of porosity and permeability by crude method / core samples
			CO4	The students will learn Numerical problems based on porosity and permeability and Study of Isopach maps
			CO5	The students will learn Panel / Fence diagrams and Categorization of Petroliferous basins of India
			CO6	A student will understand and learn about the basic concepts of Petrology Geology with respect to geology as to enable them to work as a Petroleum Geologist.
	GL 329	Practicals related to GL 325 and	CO1	The course introduces the students to the Earth's climate system and explores the science of global climate change using

		GL 326		different proxies.
			C02	This course is devised to provide basic knowledge of geological mapping and surveying techniques.
			C03	The students will learn Preparation and interpretations of Isotherm and Isobar on map. Distribution of major wind patterns on World map.
			C04	The students will learn Preparation of paleogeographic maps (distribution of land and sea) of India during specific geological time intervals
			C05	The students will learn Numerical exercises on interpretation of proxy records for paleoclimate and show ocean current on world map
			C06	The students will learn Plane table chain survey and Magnetic compass survey or GPS survey. Stereographic Problems involving two intersecting planar features
			C07	The students will learn field work for about ten days in an area of geological interest anywhere in India. Systematic collection of geological samples, data collection & preparation of geological field report.