

Shahid Matangini Hazra Govt. General Degree College for Women

Department of Geology

Programme outcome & Course Outcomes of Geology

Programme outcome (PO) in Geology (Honours)

Students will acquire a solid foundational knowledge of the entire science of geology regarding earth materials, earth history, petrology of the rocks, sedimentation and stratigraphy, deformation processes and structural features, and topographic processes and landforms. They will develop the skills to communicate complex geological concepts in clear, technically correct sentences. They will also develop the skills to verbally communicate complex geological concepts. They will also be able to use some software applications for research work such as CorelDraw, Matlab, Q-GIS, OpenRose, ImageJ etc. They will develop the skills and dispositions necessary to contribute to the democratization of society by obtaining and retaining employment as professional geologists.

PO	Description
PO1	Applying basic Geology Concepts
PO2	Developing fundamental understanding of the field
PO3	Ability of making use of Geological Problems
PO4	Developing skills in performing analysis and interpretation of data
PO5	Developing investigative Skills
PO6	Developing Technical and ICT skills
PO7	Developing skills in Mathematical modelling

Programme Specific Outcome (PSO):

PSO	Description
PSO1	Demonstrate a working knowledge of the terminology of geology with a comprehensive understanding of the earth's interior, surface, resources, climate, biosphere, and the different methods used to study them and as well as the optical and physical properties of minerals in hand specimens as well as under the microscope..
PSO2	Receive training in geochemistry of earth and geological field techniques such as mapping and surveying required for collection, interpretation and application of the geological data.
PSO3	Develop the knowledge regarding the basic concepts of Igneous and sedimentary petrology. Understand the formation and preservation of fossils, identifications of invertebrate and plant fossils.
PSO4	Develop the knowledge regarding the basic concepts of stratigraphy in order to understand the Precambrian and Phanerozoic stratigraphy of India, along with an Understanding of metamorphic petrology.
PSO5	Receive training in hydrogeology, economic geology and fuel geology. Understand various types of ore-forming processes and their relationship with tectonism.
PSO6	Recognize the importance of remote sensing and geographic information system in data acquisition and interpretation of satellite images and aerial photographs. Be professional geologist through exposure to theory and field exploration techniques in earth sciences.

Course outcome

On successful completion of the course, the student will be able to:

SEMESTER I

Course name	Course	Course outcome
Core 1: Earth System Science	CO1	CO1.1 Explain about Solid Earth, Hydrosphere, Atmosphere and Biosphere. CO1.2 Describe the Earth's internal structure. CO1.3 Examine plate tectonics, volcanism, isostasy, earthquake. CO1.4 Describe Oceanic current system and effect of Coriolis force. CO1.5 Discuss about Earth surface processes. CO1.6 Analyse the Distribution of elements in solar system and in Earth.
Core 2: Mineral Science	CO2	CO2.1 Identify different types of crystals and their crystal system. CO2.2 Identify common rock-forming minerals in hand specimen and in thin section using diagnostic physical, optical, and chemical properties; Predict the formation environment of a silicate mineral; CO2.3 Describe the information that minerals can provide about Earth processes and Earth history; CO2.4 Apply the basic techniques of mineral characterization.

SEMESTER II

Course name	Course	Course outcome
Core 3: Elements of Geochemistry	CO3	CO3.1 Discuss the evolution of the early Earth from proto-planetary material and its differentiation to present day state; CO3.2 Describe the composition of the Earth's main geochemical reservoirs CO3.3 Explain element fractionation and how this can be used to understand geochemical processes. CO3.4 Apply radiogenic isotope signatures to trace the source of minerals, rocks and to date magmatic and metamorphic events.
Core 4: Structural Geology	CO4	CO4.1 Identify the basic structural elements of lithounits. CO4.2 Describe the different types of ductile and brittle deformational structures. CO4.3 Identify fold, faults, foliation and lineation in regional scale CO4.4 Examine shear zone and related features.

SEMESTER III

Course name	Course	Course outcome
Core 5: Igneous petrology	CO5	CO5.1 Apply the concept of melt generation and crystallization mechanisms to common igneous rocks CO5.2 Identify different igneous rocks and their common tectonic occurrences. CO5.3 State different magmatic differentiation process. CO5.4 Discuss the rock textures with the help of phase diagram. CO5.5 Identify different igneous body in field.

Core 6: Sedimentary petrology	CO6	<p>CO6.1 Apply the concept of fluid flow, fluid- sediment interaction in describing the formation of bedforms at various scales in different flow regime conditions;</p> <p>CO6.2 Describe scales of sedimentary grain size measurement and statistical analysis of data to interpret provenance, transportation history or depositional environment;</p> <p>CO6.3 Describe texture and structure of clastic sedimentary rocks;</p> <p>CO6.4 Compute paleocurrent data from the orientation of sedimentary structures;</p> <p>CO6.5 Analyse the signatures in rocks to deduce the depositional setting of sedimentary rocks;</p> <p>CO6.6 Describe and interpret the diagenetic overprinting of chemical sedimentary rocks;</p>
Core 7: Palaeontology	CO7	<p>CO7.1 Define fossils and fossilization processes.</p> <p>CO7.2 Identify the older life forms with their external and internal features.</p> <p>CO7.3 Apply the morphological modifications to deduce the ecology.</p> <p>CO7.4 Apply the concepts of principles of speciation and evolution.</p>
SEC 1: Field geology I	CO8	<p>CO8.1 Arrange field visit and lead the group</p> <p>CO8.2 Use topographic sheets in field and mark location in topographic sheet using physical features and bearing.</p> <p>CO8.3 Use GPS in the field.</p> <p>CO8.4 Identify the rocks and geological structures (primary and deformational) in field.</p> <p>CO8.5 Collaborate and co-operate effectively to perform in group fieldwork as well as staying together in groups in hotels/lodges after returning from field.</p>

SEMESTER IV

Course name	Course	Course outcome
Core 8: Metamorphic Petrology	CO9	<p>CO9.1 Identify the mineralogy, texture and microstructure of the metamorphic rock.</p> <p>CO9.2 Recognize the process of metamorphism and their different types.</p> <p>CO9.3 Identify the pressure temperature condition of the rock through geothermobarometry.</p> <p>CO9.4 Explain the tectonic evolution through nature of metamorphism and deformational process</p>
Core 9: Principles of Stratigraphy and Precambrian Stratigraphy of India	CO10	<p>CO10.1 Apply the basic principles of stratigraphy, concepts of stratigraphic units and nomenclature</p> <p>CO10.2 Describe the crustal evolution during the Precambrian in peninsular India and how the biosphere responded to the Precambrian-Cambrian boundary events.</p>
Core 10: Phanerozoic Stratigraphy of India	CO11	<p>CO11.1 Apply the concept of plate tectonic movements that separated India from contiguous landmasses and shaped the depositional basins of the Indian Phanerozoic, their effects on climate and life.</p> <p>CO11.2 Describe the stratigraphy and sedimentation in India – Asia</p>

		continental collision zone and Himalayan foreland basin.
SEC 2: Field geology2	CO12	CO12.1 Plan field visit and lead the group CO12.2 Construct the geological map in a particular area. CO12.3 Correlate the stratigraphy of that area. CO12.4 Participatory management for group tasks.

SEMESTER V

Course name	Course	Course outcome
Core 11: Hydrogeology	CO13	CO13.1 Describe the occurrence of groundwater, water bearing properties of formations, aquifer types and aquifer parameters. CO13.2 Apply the concept of development of water wells, CO13.3 Estimate the aquifer parameter and to deduce the groundwater flow under different conditions. CO13.4 Describe the groundwater chemistry and its influence in the society CO13.5 Apply the concepts of groundwater exploration in an integrated way.
Core 12: Economic Geology	CO14	CO14.1 Recognize ore minerals and their distribution in India. CO14.2 Describe different types of ore forming processes. CO14.3 Calculate the methods of ore estimation. CO14.4 Delineate the concept of grade, tenor of ore minerals.
DSE 1: Introduction to Geophysics	CO15	CO15.1 Explain different kinds of geophysical methods of exploration. CO15.2 Apply those methods in exploration of different kinds of ore body. CO15.3 Recognize geophysical anomalies. CO15.4 Interpret those anomalies to identify the mineral deposits.
DSE 2: Fuel Geology	CO16	CO16.1 Apply the fundamentals of coal and petroleum in identifying the coal and petroleum forming sedimentary environments, effect of tectonics and sea-level changes on coal and petroleum formation. CO16.2 Describe the basis of coal classification, concept of grade, type and rank in coal and analyse the techniques in coal and its importance in coal classification and their use for various industries. CO16.3 Describe the concept of underground coal gasification, clean coal technology, carbonization etc. coal as unconventional source of energy (CBM, Coal liquefaction) and its potential in Indian and environmental impact. CO16.4 Apply the concept of plate tectonics and supercontinent configuration in terms of coal deposits in India vis-a-vis rank, grade and their geological and geographical distribution and utilization. CO16.5 Use the concept of kerogen and its type to the origin of fossil fuel. CO16.6 Apply the concept of origin to accumulation in deducing the petroleum system

SEMESTER VI

Course name	Course	Course outcome
Core 13: Geomorphology, Remote sensing & GIS	CO17	CO17.1 Identify different geomorphological features related with different surface processes and clarify the basic idea about remote sensing & GIS and their application. CO17.2 Identify the satellite imagery through data interpretation. CO17.3 Recognize the types of aerial photography, scale of resolution, principles of stereoscopy, digital image processing, etc and use GIS and GPS.
Core 14: Engineering Geology	CO18	CO18.1 Explain different geological factors that controls engineering constructions. CO18.2 Examine the basic concept behind foundation treatment, rock aggregate and support mechanism. CO18.3 Analyse the techniques of site investigations and compute different parameters of rock mechanics.
DSE 3: Exploration Geology	CO19	CO19.1 Recognize the different kinds of exploration methods and apply those exploration methods in field. CO19.2 Classify mineral deposits with respect to processes of formation and exploration strategies. CO19.3 Evaluate the sampling data - Mean, mode, median, standard deviation and variance and compute the methods of reserve estimation and its error.
DSE 4: Geodynamics	CO20	CO20.1 Define the concept of lithosphere and asthenosphere, physical character of lithosphere and asthenosphere and concept of plate. CO20.2 Apply the concept of palaeomagnetism and supercontinental cycle in plate tectonics.