

DEPARTMENT OF GEOLOGY
PROGRAMME OUTCOMES (POs), PROGRAMME SPECIFIC OUTCOMES (PSOs) AND
COURSE OUTCOMES (COs)

Name of the Programme: B. Sc. Geology (Honours) [Under CBCS]

1. Programme Outcome (PO):

A. Graduate Attributes: Some of the characteristic attributes that a graduate should demonstrate:

- a) Disciplinary knowledge
- b) Communication Skills
- c) Critical thinking
- d) Problem solving
- e) Analytical reasoning
- f) Research-related skills
- g) Cooperation/Teamwork
- h) Scientific reasoning
- i) Reflective thinking
- j) Information/digital literacy
- k) Self-directed learning
- l) Multicultural competence
- m) Moral and ethical awareness/reasoning
- n) Leadership readiness/qualities
- o) Lifelong learning

B. Qualification descriptors: Qualification descriptors for a bachelor's degree with honours are as follows:

- a) Demonstrate (i) a systematic, extensive and coherent knowledge and understanding of an academic field of study as a whole and its applications, and links to related disciplinary areas/subjects of study; including a critical understanding of the established theories, principles and concepts, and of a number of advanced and emerging issues in the field of study; (ii) procedural knowledge that creates different types of professionals related to the disciplinary/subject area of study, including research and development, teaching and government and public service; (iii) skills in areas related to one's specialization and current developments in the academic field of study, including a critical understanding of the latest developments in the area of specialization, and an ability to use established techniques of analysis and enquiry within the area of specialization.
- b) Demonstrate comprehensive knowledge about materials, including current research, scholarly, and/or professional literature, relating to essential and advanced learning areas pertaining to the chosen disciplinary areas (s) and field of study, and techniques and skills required for identifying problems and issues relating to the disciplinary area and field of study.
- c) Demonstrate skills in identifying information needs, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources, analysis

and interpretation of data using methodologies as appropriate to the subject(s) for formulating evidence-based solutions and arguments.

- d) Use knowledge, understanding and skills for critical assessment of a wide range of ideas and complex problems and issues relating to the chosen field of study.
- e) Communicate the results of studies undertaken in an academic field accurately in a range of different contexts using the main concepts, constructs and techniques of the subject(s) of study.
- f) Address one's own learning needs relating to current and emerging areas of study, making use of research, development, and professional materials as appropriate, including those related to new frontiers of knowledge.
- g) Apply one's disciplinary knowledge and transferable skills to new/unfamiliar contexts and to identify and analyze problems and issues and seek solutions to real-life problems.
- h) Demonstrate subject-related and transferable skills that are relevant to some of the job trades and employment opportunities.

2. Programme Specific Outcomes:

The student graduating with the degree of B. Sc. Geology (Honours) should be able to:

- (i) acquire a fundamental/systematic or coherent understanding of the academic field of geology, its different learning areas and applications in basic geology like mineralogy, petrology, stratigraphy, palaeontology, economic geology, hydrogeology, etc. and its linkages with related interdisciplinary areas/subjects like geography, environmental sciences, physics, chemistry, mathematics, life sciences, atmospheric sciences, remote sensing, computer science, information technology,
- (ii) acquire procedural knowledge that creates different types of professionals related to the disciplinary/subject area of geology, including professionals engaged in research and development, teaching and government/public service,
- (iii) acquire skills in areas related to one's specialization area within the disciplinary/subject area of geology and current/emerging developments in the field of geosciences,
- (iv) demonstrate the ability to use skills in geology and its related areas of technology for formulating and tackling geosciences-related problems and identifying and applying appropriate geological principles and methodologies to solve a wide range of problems associated with geosciences,

- (v) recognize the importance of remote sensing and GIS, mathematical modelling/simulation and computing, and the role of approximation and mathematical approaches to describing the physical world,
- (vi) plan and execute geology-related experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate software such as programming languages and purpose-written packages, and report accurately the findings of the experiment/investigations while relating the conclusions/findings to relevant theories in geology,
- (vii) generate communication skills involving the ability to listen carefully, to read texts and research papers analytically and to present complex information in a concise manner to different groups/audiences of technical or popular nature,
- (viii) generate analytical skills involving paying attention to detail and ability to construct logical arguments using correct technical language related to geology and ability to translate them with popular language when needed; ICT skills; personal skills, such as the ability to work both independently and in teams

3. Course Outcome:

[Abbreviations used: C = Core Courses; DSE = Department Specific Elective; GE = Generic Elective; P = Practical; SEC = Skill Enhancement Course; T – Theoretical]

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
SEMESTER-I		
SHGEL/101/C1(T) & SHGEL/101/C1(P)	Earth System Science	Focus on the introduction of the Earth System as a whole, its origin, structure, composition, resources, history and the nature of processes, which have given rise to its present state; and to study lithosphere, atmosphere and biosphere
	Earth System Science Lab	
SHGEL/102/C2(T) & SHGEL/102/C2(P)	Mineral Science	Help to Understand the fundamentals of crystallography, structure and chemistry of minerals along with descriptive mineralogy and to learn the optical and crystallographic properties of the minerals and their occurrences.
	Mineral Science Lab	
SHGEL/103/GE2(T) & SHGEL/103/ GE1(P) [To be opted by the honours students of other discipline]	Essentials of Geology	Give an overall introduction to geology and presents an understanding of the processes in action on the Earth’s surface and within the Earth and their impact.
	Essentials of Geology Lab	
	Soil: Present and Past	Cover on different aspects of recent soil and palaeosol.
	Soil: Present and Past Lab	
SEMESTER-II		
SHGEL/201/C3(T) & SHGEL/201/C3(P)	Elements of Geochemistry	Include an introduction, how geochemical principles are used to explain the formation of the elements and solar system, the Earth’s geochemical composition and differentiation into different reservoirs, the age of rocks and the surface environment.
	Elements of Geochemistry Lab	
SHGEL/202/C4 (T) & SHGEL/202/C4 (P)	Structural Geology	Enable to understand (a) the concepts of stress, strain and deformation, significance of brittle, plastic and ductile deformation, (b) origin and mechanisms of faults, fractures, and folds, (c) processes and fabrics that occur in shear zones and their kinematic significance, and (d) deriving tectonic histories from analysis of geological maps.
	Structural Geology Lab	

SHGEL/203/GE2(T) & SHGEL/203/ GE2(P) <i>[To be opted by the honours students of other discipline]</i>	Rocks and Minerals	Familiarise with common rock-forming minerals, rocks and crystals; their chemistry and mesoscopic and microscopic identification.
	Rocks and Minerals Lab	
	Fossils and their application	Enable to (a) identify older life forms with their external and internal features; (b) deduction of ecology with the application of morphological modifications, and (c) apply principles of speciation and evolution
	Fossils and their application Lab	
SEMESTER-III		
SHGEL/301/C5(T) & SHGEL/301/C5(P)	Igneous Petrology	Focus on the major aspects of igneous rocks - their general characteristics, mode of occurrences, classification, genesis, magma characteristics and Indian occurrences.
	Igneous Petrology Lab	
SHGEL/302/C6(T) & SHGEL/302/C6(P)	Sedimentology	Enable to understand fundamentals of sedimentary processes and their products, formation, and basin tectonics, and to comprehend description of processes and products of different sedimentary environments viz. continental, marginal marine and marine.
	Sedimentology Lab	
SHGEL/303/C7(T) & SHGEL/303/C7(P)	Palaeontology	Enable to (a) identify older life forms with their external and internal features; (b) deduction of ecology with the application of morphological modifications, and (c) apply principles of speciation and evolution.
	Palaeontology Lab	
SHGEL/304/GE3(T) & SHGEL/304/ GE3(P) <i>[To be opted by the honours students of other discipline]</i>	Earth's Surface Processes	Help to understand different surface processes, soil formation and natural hazards.
	Earth's Surface Processes Lab	
	Physics and Chemistry of Earth	Acquaint with the Earth's interior, Earth's magnetic field, isotope chemistry, environmental geochemistry, isostasy, nucleosynthesis etc
	Physics and Chemistry of Earth Lab	
SHGEL /305/SEC-1	Field Geology-I	Provide basic knowledge of geological equipment and surveying techniques. It also will upgrade and relate the theoretical knowledge of geological aspects to field observations.
SEMESTER-IV		
SHGEL/401/C8(T) & SHGEL/401/C8(P)	Metamorphic Petrology	Focus on the major metamorphic rocks - their general characteristics, mode of occurrences, classification and genesis. It helps to understand dynamic nature of lithosphere leading to solid state transformations of rocks which gives clue to the past processes which are not possible to reconstruct by other means
	Metamorphic Petrology Lab	
SHGEL/402/C9(T) & SHGEL/402/C9(P)	Principles of Stratigraphy and Precambrian Stratigraphy of India	Help to: (a) analyse basic principles of stratigraphy, different types of stratigraphic units and how they are named., and (b) use the fossil record in establishing age of the rock unit and correlation with other area, (c) give an account of criteria of stratigraphic correlation.
	Prin. Strat. & Precam. Strat. India Lab	
SHGEL/403/C10(T) & SHGEL/403/C10(P)	Phanerozoic Stratigraphy of India	Acquaint with different Phanerozoic stratigraphy of India, characteristics of Precambrian-Cambrian boundary, Permian-Triassic boundary, Cretaceous-Tertiary boundary in India and correlation of respective fossil assemblages.
	Phan. Strat. of India Lab	
SHGEL/404/GE4(T) & SHGEL/404/ GE4(P) <i>[To be opted by the honours students of other discipline]</i>	Earth's Resources	Develop skills in different areas related to Earth's resources - ore deposits, fuel and energy resources.
	Earth resources Lab	
	Natural Hazards and Disaster Management	Acquire knowledge about various natural hazards and disaster management, hazard zonation mapping and application of Remote Sensing and GIS in real time disaster monitoring, prevention and rehabilitation.
	Natural Hazards and Disaster Management Lab	
SHGEL /405/SEC-2	Field Geology-II	Focus on the study of minerals and rocks in the field outcrop. They will also be able to identify measure the attitude of different planar and linear elements in the rocks.

SEMESTER-V		
SHGEL/501/C11(T) & SHGEL/501/C11(P)	Hydrogeology	Enable to gather knowledge about the physical and chemical attributes, occurrence, movement, and exploration of the groundwater resources, water wells, aquifer parameter estimation and the science of groundwater flow under different conditions.
	Hydrogeology Lab	
SHGEL/502/C12(T) & SHGEL/502/C12(P)	Economic Geology	Familiarize with common ore minerals; demonstrate knowledge of the variety of ore-forming processes; understand the genetic controls exerted by physical and chemical processes on ore formation in various geologic settings; and differentiate between resources and reserves and their estimation.
	Economic Geology Lab	
SHGEL/503/DSE1(T) & SHGEL/503/DSE1(P)	Fuel Geology	Enable to understand the basic concept of occurrences, distribution and exploration of coal, petroleum and nuclear fuels.
	Fuel Geology Lab	
	Introduction to Geophysics	Give basic concepts of geophysics and the application different geophysical techniques in surface and subsurface explorations for Earth's resources.
	Introduction to Geophysics Lab	
SHGEL/504/DSE2(T) & SHGEL/504/DSE2(P)	Mineral Exploration and Mining	Envisage to expose to the topics like different methods of exploration, sampling principle, techniques of estimation of reserves, mining, ore dressing and beneficiation.
	Mineral Exploration and Mining Lab	
	Earth and Climate	Deals with the Earth's climate system including interaction of the climate with the biosphere, the cyclicity of the climate and factors related with the climate change and monsoon.
	Earth and Climate Lab	
SEMESTER-VI		
SHGEL/601/C13(T) & SHGEL/601/C13(P)	Geomorphology, Remote Sensing and GIS	Provide an overview on landforms and basic level fundamental principles of Remote Sensing and GIS and their applications.
	Geomorphology, Remote Sensing and GIS Lab	
SHGEL/602/C14(T) & SHGEL/602/C14(P)	Engineering Geology	Deal with the application of geological knowledges on different engineering projects, landslides and earthquakes.
	Engineering Geology Lab	
SHGEL/603/DSE3(T) & SHGEL/603/DSE3(P)	Oceanography and Marine Science	Help to understand about the basic concepts of oceanography focussing fundamentals of oceans including its chemical and physical aspects and marine organism.
	Oceanography and Marine Science Lab	
	Medical Geology	Focus on the distribution of trace elements and its cyclic movement through the abiotic-biotic environment and their influence on human health, flora and fauna. It also includes the uses of geological materials in medicines and in forensic sciences.
	Medical Geology Lab	
SHGEL/604/DSE4(T) & SHGEL/604/DSE4(P)	Geodynamics	Deal with the origin and evolution of early earth systems, continental drift, sea floor spreading and plate tectonics, origin and evolution of continental crust.
	Geodynamics Lab	
	Urban Geology	Use of geology related to agriculture, land use, water resource management, waste management and planning of urban areas.
	Urban Geology Lab	