# Programme Outcomes, Programme Specific Outcomes and Course Outcomes

# For UG Programmes running in NBU Campus

**Programme Name: B.Sc in Geology**
**(e.g *B.Sc in Geology)***

***Number of Semesters: 6***

Department of Geology
**University of North Bengal**
West Bengal, INDIA

## Programme Outcomes

- Ensuring an atmosphere conducive to teaching and learning
- Preparing students for the competitive world
- Holistic development of young adults enrolled as students
- Providing Quality Higher Education and taking care of intellectual, social, economic, emotional needs of students
- Adopting student-friendly approaches to teaching and learning as far as practicable
- Kindling interest in students not only in their subjects but also in related fields and help them ramify and diversify areas of interest
- Encouraging participation of Faculty in discussions to teach students with different learning paces
- Promotion of leadership qualities

## Programme Specific Outcomes

- Collaborative learning is encouraged during the field training programmes and educational tours
- Encouraging faculty members to participate in conferences, seminars, workshops and other faculty development programmes to enrich and update their academic and administrative knowledge and capacity building
- Encouraging standard research activities of faculty members and students
- Organizing Career Counselling sessions for students
- Imparting training to members of the non-teaching staff to utilize computer facilities in documentation
- Overall development of an ethical sense and increasing awareness in terms of gender sensitization, cleanliness, environmental protection etc.
- Inculcation of value-orientation in students through the promotion of a sensitive attitude towards one's surrounding and culture
- Assists students in competitive examination (JAM etc.)

## Course Outcomes

| SEMESTER—I | | |
|---|---|---|
| Course Code | Course Name | Course Outcomes |
| Core/ 01 | Earth System | • Concept of Plate tectonic<br>• Concept of time in geological studies |

| | | |
|---|---|---|
| | Science | • Cosmic abundance of elements<br>• Internal structure of Earth<br>• Ability to understand different processes working on Earth<br>• Ability to understand origin of life on Earth<br>• Complete knowledge about the tectonic framework of the Earth<br>• Idea about the inter-relationship between biosphere, hydrosphere and atmosphere |
| Core/ 02 | Mineral Science | • Concept of Crystallography<br>• Crystal Chemistry and Structure<br>• Physical properties of rock forming minerals<br>• Optical properties of rock forming minerals<br>• Ability to identify different minerals in hand specimen<br>• Ability to understand different crystal systems<br>• Ability to identify different minerals under microscope<br>• Complete understanding on how to use petrological microscope<br>• Idea about structure of minerals and chemical bonding |

| SEMESTER—II | | |
|---|---|---|
| Course Code | Course Name | Course Outcomes |
| Core/ 03 | Elements of Geochemistry | • Concepts of geochemistry<br>• Element transport<br>• Analytical Instruments, Data Acquisition and Interpretation<br>• Ability to understand geochemistry of Earth as a planet<br>• Ability to understand Layered structure of Earth<br>• Idea about Geochemical classification of elements<br>• Complete understanding of different geochemical techniques employed in geology<br>• Idea about Isotope Geochemistry |
| Core/ 04 | Structural Geology | • Structure and Topography<br>• Stress and strain in rocks<br>• Folds, Foliation and lineation<br>• Fractures and faults<br>• Ability to understand different structural features of Earth<br>• Ability to understand the mechanics of deformation<br>• Complete knowledge to interpret Topographical maps<br>• Complete grasp of mathematical methods to solve structural geology problems |
| SEMESTER—III | | |
| Course Code | Course Name | Course Outcomes |
| Core/ 05 | Igneous Petrology | • Physical properties and formation process of magma<br>• Formation and types of igneous rocks<br>• Geothermal gradient<br>• Forms, Textures and Structures of igneous rocks<br>• Phase diagrams in understanding crystal-melt equilibrium<br>• Magma generation, their emplacement and evolution<br>• Different magmatic processes<br>• Magmatism in different tectonic settings<br>• Petrogenesis of various types of igneous rocks |

| | | |
|---|---|---|
| Core/ 06 | Sedimentology | • Outline of sedimentation process<br>• Sedimentary textures<br>• Fluid flow and Mass flow<br>• Sedimentary structures and identification of sedimentary structures<br>• Paleocurrent analysis<br>• Components and classification of Siliciclastic and carbonate rocks<br>• Tectonic control on sandstone composition<br>• Concepts and stages of diagenesis |
| Core/ 07 | Paleontology | • Fossilization and fossil record<br>• Species concept with special reference to paleontology<br>• Taxonomic hierarchy Theory of organic evolution<br>• Important invertebrate groups (Bivalvia, Gastropoda, Brachiopoda) and their biostratigraphic significance<br>• Paleobiogeographic implications of ammonites in Mesozoic biostratigraphy<br>• Functional adaptation in trilobites and ammonoids<br>• Origin and major steps in vertebrate evolution<br>• Origin, diversity and extinction of dinosaurs<br>• Horse and Human evolution<br>• Introduction to Ichnology<br>• Application of fossils in Stratigraphy |
| SEMESTER—IV | | |
| Course Code | Course Name | Course Outcomes |
| Core/ 08 | Metamorphic Petrology | • Controls and types of Metamorphism<br>• Concept of P-T-t paths<br>• Metamorphic Facies and grades<br>• Mineralogical phase rules<br>• Principles of geothermobarometry and textural identification<br>• Metamorphism and Tectonism<br>• Different Metamorphic rock Association<br>• Ultra High Pressure and Ultra High Temparature metamorphism |
| Core/ 09 | Principles of Stratigraphy and Indian Stratigraphy | • Fundamentals of litho-, bio- and chrono-stratigraphy<br>• Introduction to concepts of dynamic stratigraphy<br>• Code of stratigraphic nomenclature |

| | | |
|---|---|---|
| | | • Sequence stratigraphy and their subdivisions with Indian examples<br>• Walther's Law of Facies.<br>• Concept of paleogeographic reconstruction<br>• Physiographic and tectonic subdivisions of India<br>• Phanerozoic Stratigraphy of India<br>• Deccan, Rajmahal, Sylhet Trap<br>• Precambrian-Cambrian boundary, Permian-Triassic boundary, and Cretaceous-Tertiary boundary in India |
| Core/ 10 | Hydrogeology | • Scope of hydrogeology and its societal relevance<br>• Hydrologic cycle<br>• Rock properties affecting groundwater<br>• Types, parameters, anisotropy and heterogeneity of aquifers<br>• Groundwater flow<br>• Well hydraulics and Groundwater exploration<br>• Physical and chemical properties of water<br>• Sea water intrusion in coastal aquifers<br>• Groundwater management<br>• Rainwater harvesting and artificial recharge of groundwater |
| SEMESTER—V | | |
| Course Code | Course Name | Course Outcomes |
| Core/11 | Economic Geology | • Basic understanding of the introductory concepts of genesis and localization of ore deposits plus the minerals associated with ore deposits<br>• Understanding the structure and texture of ore deposits<br>• Introductory concepts of mineral exploration |
| Core/12 | Engineering Geology | • Introductory concepts on the geological aspects of the location, design, construction, operation and maintenance of various engineering works.<br>• Basic outline of rock mass properties and rock quality assessment<br>• To understand role engineering geologists in site investigation and characterization<br>• Causes of Natural disasters and its implication in various engineering constructions, possible mitigation and important case histories related to Indian Civil Engineering Projects |
| Department Specific Elective offered (Any two of the following to be chosen by the students) | | |
| DSE/1 | Exploration Geology | • Introduction to the various exploration techniques<br>• Comprehensive insight into the drilling and logging techniques<br>• Basic outline of the reserve estimations and Errors |
| DSE/2 | Earth and Climate | • To understand how earth's climate system works (controlling factors, response and feedbacks in the climatic system, orbital |

| | | |
|---|---|---|
| | | cyclicity)<br>• To understand the interaction between hydrosphere and atmosphere<br>• To discuss the heat budget of earth<br>• To understand the response of biosphere to earth's climate (especially the anthropogenic effects causing climate change)<br>• Basic outline of mechanism of monsson |
| DSE/3 | Fuel Geology | • Basic understanding on the origin, classification of the coal and Coal Petrology<br>• To highlight global and Indian scenario of Coal Bed Methane<br>• First order knowledge on Underground coal gasification and Coal liquefaction<br>• Basic understanding on the origin of petroleum; Chemical composition and physical properties of crudes in nature.<br>• Introductory idea about petroleum Reservoirs and Traps<br>• Importance of other fuels (e.g., Gas Hydrate; Nuclear Fuel) |
| DSE/4 | River Science | • Basic idea about stream hydrology; Physical properties of water, sediment and channel flow<br>• Introduction to the sedimentological processes associated in a river basin<br>• Basic idea about drainage network, pattern of alluvial rivers and associated landscapes<br>• Introductory concept of integrated stream management and river ecology. |
| SEMESTER—VI | | |
| Course Code | Course Name | Course Outcomes |
| Core-13 | Geomorphology | • Understanding of the conceptual and dynamic aspects of landform development (introductory concepts of geomorphology)<br>• Role of plate tectonics in the landscape formation<br>• Overview of Indian Geomorphology, Extraterrestrial landforms |
| Core-14 | Remote Sensing and GIS | • Fundamental concepts of photogeology (interpretation of aerial photographs)<br>• Basic principles to identify the earth surface features from satellite images and digital image processing<br>• Analyze the basic components of GIS; introduction to GPS |
| Department Specific Elective offered (Any two of the following to be chosen by the students) | | |
| DSE/5 | Evolution of Life through Time | • To understand how life originate and evolved in the earth. Major bio-events and geological time scales<br>• Introductory concept of geobiology<br>• Basic idea of fossilization processes and modes of fossil preservation. |
| DSE/6 | Oceanography | • Introductory concept of chemical and Physical aspects of Ocean<br>• Role of plate tectonics on the land-Ocean distribution<br>• First order idea about the marine Life and the Environment |
| DSE/7 | Introduction to Geophysics | • To understand the interrelationship between geology and geophysics<br>• How geophysics helps to explain geodynamical features of the earth<br>• Introduction to general and exploration geophysics |

| | | |
|---|---|---|
| | | • Basic concepts of geophysical methods and integrated approach |
| DSE/8 | Physics and chemistry of earth | • To understand what and how physico-chemical processes are working in Earth's surface and interior<br>• Basic idea on the elements of earth's magnetism<br>• Introduction to the environmental geochemistry |