

# Kazi Nazrul University



**National Curriculum Course Framework(NCCF)**

**For**

**Eight Semester Course Under**

**Choice Based Credit System (CBCS)**

**Syllabus for B.Sc. (Hons.)**

**in Geology**

**2023**

## FIRST SEMESTER

### Department Specific Major(and Minor) Course

Course Name: EARTH SYSTEM SCIENCE

Course Code: BSCGELMJ101

(CREDITS: Theory 4, Practical 1)

### THEORY

#### **Unit 1: Introduction (Credit Hours - 10)**

Earth System Science - Definition, history of evolution of Earth Sciences, and its different branches;

Brief idea about the origin of the Universe, Solar System and its planets; the Terrestrial and Jovian planets; Meteorites and Asteroids; Earth: origin, size, shape, mass, density, rotational and revolution parameters.

#### **Unit 2: Solid Earth and its fluid cover (Credit Hours - 10)**

Internal constitution - its recognition vis-à-vis solid earth geophysics: crust, mantle, core, evidence from seismic waves and rocks, lithosphere and asthenosphere; Elementary idea about the hydrosphere, atmosphere and biosphere:

Nature of Earth's magnetic field

#### **Unit 3: Crust and the supracrustal materials (Credit Hours - 10)**

Major constituents of the crust; Minerals - definition and classification; Rocks - Types, rock cycle, brief idea about their origin, general classification; Fossil: Definition, broad idea about different types.

#### **Unit 4: Tectonics (Credit Hours - 10)**

Brief idea about the Continental Drift Theory, Sea-floor Spreading and Plate Tectonics

#### **Unit 5: Earth surface processes (Credit Hours - 10)**

Rock weathering; Formation of soil, soil profile and soil types; Erosion; mass wasting; Geological work of wind, river and glacier; coastal processes, oceanic current system and effect of Coriolis force; Concepts of eustasy

#### **Unit 6: Introduction to the concept of deep time in geological studies (Credit Hours - 10)**

Stratigraphy: definition and scope

Brief history of development of stratigraphic principles; concepts of Neptunism, Plutonism and Uniformitarianism

Geological Time Table, introduction to geochronological methods and their application in geological studies

Fundamental laws of stratigraphy: Superposition, Faunal succession and correlation

## PRACTICAL

Study of major geomorphic features and their relationships with outcrops through physiographic maps; Principles of Topographic Sheet indexing; Detailed study of topographic sheets and preparation of physiographic description of an area, Preparation of topographic profile.

### SUGGESTED READINGS:

1. Duff, P. M. D., & Duff, D (Eds.),1993. *Holmes' principles of physical geology*. Taylor & Francis.
2. Emiliani, C.,1992. *Planet earth: cosmology, geology, and the evolution of life and environment*. Cambridge University Press.
3. Gross, M. G. ,1977. *Oceanography: A view of the earth*.
4. Robert S. Anderson and Suzanne P. Anderson, 2010. *Geomorphology - The Mechanics and Chemistry of Landscapes*. Cambridge University Press.
5. Faure, Gunter. 1986. "Principles of isotope geology".Wiley International.

### Skill Enhancement Course

Course Name: GEOLOGICAL FIELD WORK

Course Code: BSCGELSE101

(CREDITS: Practical 3)

#### **Unit 1: Basic idea about field geology (10 Credit Hours)**

Field work ethics: dos and don'ts in field; Determination of topographic sheet number; Study of topographic sheets; Comparison of topographic sheet of a specific area with satellite imagery (Google Earth); Basic principles of clinometer compass and Brunton compass

#### **Unit 2: Field work (At least of five days duration; 35 Credit Hours)**

Field reconnaissance and identification of reference unit; Basic techniques of fixation of location on the reference toposheet or satellite imagery; study of different types of outcrops, rock types and their disposition; acquisition of basic field data; collection of samples (including oriented samples); basic principles of field photography.

### OR SEMINAR

Identification of a topic related to Earth System Science, related to but beyond the topics being covered under theory; preparation of a write up and a power point presentation to be presented in an open-house seminar.

## SECOND SEMESTER

### Department Specific Major(and Minor) Course

Course Name: MINERAL SCIENCE

Course Code: BSCGELMJ201

(CREDITS: THEORY-3, PRACTICAL-2)

### THEORY

#### Unit 1: Crystallography (15 Credit Hours)

Elementary ideas about crystal morphology in relation to internal structures; Crystal parameters and indices; Crystal symmetry and classification of crystals into point groups, space groups; Stereographic projections of symmetry elements and forms; Characteristics of crystal systems; Crystal defects; X-ray crystallography.

#### Unit 2: Rock forming minerals (15 Credit Hours)

Physical and chemical properties; Substitution principles – Goldschmidt's rule of substitution of elements; partitioning of elements between coexisting phases; Brief idea about Isomorphism, Solid solution, Pseudomorphism and Polymorphism: elementary concept on principle types – common polymorphic forms of C, SiO<sub>2</sub> and Al<sub>2</sub>SiO<sub>5</sub>; Crystal structure and its controls: bonding and coordination principles.

Classification of silicate groups based on structure and derivation of structural formulae based on composition with example of common rock-forming minerals from each group, Non-silicate structures; CCP and HCP structures

#### Unit 3: Optical mineralogy (15 Credit Hours)

Optical behaviour of crystals – Isotropic and anisotropic minerals; Nicol prism and its principle of construction; Polaroid; Refractive index of minerals; Uniaxial & Biaxial minerals; Optical indicatrix of uniaxial and biaxial minerals; Birefringence, Interference colour and use of interference colour chart; Relation between crystallographic and optical axes of crystals; Pleochroism and pleochroic scheme; Extinction; Study of interference figures; Optic sign of uniaxial and biaxial minerals

### PRACTICAL

Unit 1: Study of physical properties of common rock-forming minerals in hand specimen

Unit 2: Study of the symmetry of crystals in hand specimen; Solution of crystallographic problems through stereographic projection

Unit 3: Study of optical properties of common rock-forming minerals: quartz, orthoclase, microcline, plagioclase, perthite, nepheline, olivine, orthopyroxene, clinopyroxene, hornblende, staurolite, garnet, muscovite, biotite, calcite

Unit 4: Determination of extinction angle and pleochroic scheme; Determination of optic sign from interference figures

**SUGGESTED READINGS:**

1. Klein, C., Dutrow, B., Dwight, J., & Klein, C., 2007. *The 23rd Edition of the Manual of Mineral Science (after James D. Dana)*. J. Wiley & Sons.
2. Kerr, P. F., 1959. *Optical Mineralogy*. McGraw-Hill.
3. Verma, P. K., 2010. *Optical Mineralogy (Four Colour)*. Ane Books Pvt Ltd.
4. Deer, W. A., Howie, R. A., and Zussman, J., 1992. *An introduction to the rock-forming minerals*. London, Longman.

**Skill Enhancement Course**

Course Name: FIELD GEOLOGY

Course Code: BSCGELSE201

(CREDITS: Practical 3)

**Unit 1: Field work (At least of five days duration; 35 Credit Hours)**

Usage of topographic sheet and satellite imagery in the field; Usage of GPS  
Study of different types of rock outcrop; study of different rock types (Igneous, Metamorphic and Sedimentary) in the field; Acquisition of different field data and collection of samples including oriented ones; field photography.

**Unit 3: Sample processing (10 Credit Hours)**

Preparation of thin sections of collected samples and study under microscope; Sampling protocol, recovery and restoration of fossil samples.