

**PANDIT DEENDAYAL UPADHYAYASHEKHAWATI UNIVERSITY,  
SIKAR (RAJ.)**



Syllabus of

**Geology**

For

Three-Year

Under Graduate (B.Sc.) Program

As per the Choice Based Credit System (CBCS)

Designed in accordance with Learning Outcomes - Based Curriculum

Framework (LOCF) of National Education Police (NEP-2020)

**Syllabus- Geology**

**Semester-I &II**

for Academic Year 2023-24

(Effective for the Academic Year (2023-24))

**Faculty of Sciences**

PANDIT DEENDAYAL UPADHYAYASHEKHAWATI UNIVERSITY, SIKAR

(RAJ.)

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Pandit Deendayal Upadhyaya  
Shekhawati University,  
Sikar(Rajasthan)

## Geology-1 Physical Geology & Tectonics (PG&T)

### Unit 1

Geology & its branches; its relation with other branches of science and technology. Scope and importance of Geology. The Earth as a planet. The Solar system. Our galaxy and the universe.

Physical parameters of Earth: mass, density, shape and size of the Earth. The rotation and revolution of the earth.

Geophysical conditions of the Earth – Gravity, Heat Flow and Magnetism. Origin of the Earth.

Methods of determination of the Age of the Earth.

### Unit 2

The structure of the Earth; Outer and inner geospheres, their constitution.

Diastrophic Processes: Epeirogeny & Orogeny. Mountain belts. Geosynclines. Isostasy. Sea floor spreading.

Continental drifting. Plate Tectonics; types of plate margins, plate motion.

### Unit 3

**Elementary idea about Crustal Types: Shields, platforms, Island arcs, trenches, Rift valleys, mid-oceanic ridges and ocean basins.**

**Surface features of the Earth, Distribution of land and ocean and their peculiarities. Origin of continents and ocean.**

### Unit 4

**Surface processes – Weathering, erosion and mass wasting. Soil profiles and pedogenesis.**

**Geological work of rivers, wind, glaciers, groundwater and oceans. Coral reefs – types, distribution and origin.**

**Earthquakes - Distribution, causes, classification & effect of Earthquakes. Determination of location of Epicentre of an Earthquake Seismic waves as indicators of Earth's interior. Seismic belts and their relation to volcanic activity.**

**Volcanoes – causes and formation of volcanoes, their Types, products & distribution.**

**Geological Time Scale. Palaeomagnetism. Ice ages and past climates.**

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## Geology-1I Crystallography and Mineralogy (C&M)

### Unit 1

Crystals, their external & internal characters. Fundamental laws of crystallography. Elements of crystal symmetry, Millers and Weiss systems of notation. Classification of Crystal into systems.

Study of Crystal classes of Cubic System: Galena type, Pyrite type, Tetrahedrite type and their forms.

### Unit 2

Study of normal classes and their forms of following crystal systems: Tetragonal System, Hexagonal System (Beryl type & Calcite type), Orthorhombic System, Monoclinic System and Triclinic System.

Crystal aggregates, Twinning- elements, classification and important twinning laws.

### Unit 3

Physical properties of minerals. Concept of Isomorphism, Pseudomorphism & Polymorphism.

Petrological microscope and its construction. Principles of optics as applied to the study of minerals – shape, form, R.I., colour, pleochroism, birefringence, polarisation colour, extinction, Isotropic, Anisotropic- uniaxial and biaxial characters of minerals.

### Unit 4

Study of Chemical composition, Physical & optical properties, and occurrences of the following rock forming mineral families: Pyroxene, Amphibole, Mica, Feldspar, Feldspathoid, Quartz and Zeolite.

### Books suggested for reading:

- Holmes, Arthur., 1992, Principles of Physical Geology, Chapman and Hall, London.
- Miller., 1949, An Introduction to Physical Geology, East West Press Ltd.
- Spencer, E.V., 1962, Basic concepts of Physical Geology. Oxford & IBH.
- Mahapatra, G.B., 1994, A text book of Physical Geology, CBS Publishers.
- Press and Siever 1998, Understanding Earth, WH Freeman & Co.
- Emiliani, C., 1992, Planet earth: cosmology, geology, and the evolution of life and environment. Cambridge University Press.
- Klein, C., Dutrow, B., Dwight, J. and Klein, C., 2007, The 23<sup>rd</sup> Edition of the Manual of Mineral
- Wiley, J. and Sons, Science (after James D. Dana).
- Kerr, P. F. Hill, Graw, M.C., 1959, Optical Mineralogy.
- Verma, P. K., 2010, Optical Mineralogy (Four Colour), Ane Books Pvt Ltd.
- Deer, W. A., Howie, R. A., and Zussman, J., 1992, An introduction to the rock-forming minerals (Vol. 696). London: Longman.

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**Suggested E-resources:**

- <https://serc.carleton.edu/geo2yc/courses/46478.html>
- <https://ocw.mit.edu/courses/12-001-introduction-to-geology-fall-2013/pages/lecture-notes-and-slides/>
- [https://youtube.com/playlist?list=PL0kOtHcPhFRW64YWNXf3H\\_whgAXGZR4zK](https://youtube.com/playlist?list=PL0kOtHcPhFRW64YWNXf3H_whgAXGZR4zK)
- <https://www.youtube.com/@EarthandSpaceSciencesX>
- <https://youtu.be/fiMemypKqEI>
- <https://youtu.be/5ieigKikIRY>
- [https://youtu.be/3JZb1e\\_Su3g](https://youtu.be/3JZb1e_Su3g)
- <https://users.metu.edu.tr/lunel/>
- [https://www.science.smith.edu/geosciences/min\\_jb/Lecture\\_Notes.html](https://www.science.smith.edu/geosciences/min_jb/Lecture_Notes.html)
- <http://ruby.colorado.edu/~smyth/G30101.html>
- <https://www2.tulane.edu/~sanelson/eens211/>
- [https://profiles.uonbi.ac.ke/cnyamai/files/lecture\\_1-\\_mineralogy\\_and\\_crystallography-3\\_review.pdf](https://profiles.uonbi.ac.ke/cnyamai/files/lecture_1-_mineralogy_and_crystallography-3_review.pdf)
- <https://ninova.itu.edu.tr/en/courses/faculty-of-mines/2340/jef-232/ekkaynaklar?g209499>
- <https://fac.ksu.edu.sa/sites/default/files/Introduction%20to%20mineralogy.ppt>
- [http://academic.brooklyn.cuny.edu/geology/powell/courses/geol17\\_01/geol17\\_01.htm](http://academic.brooklyn.cuny.edu/geology/powell/courses/geol17_01/geol17_01.htm)
- <https://www.geo.arizona.edu/xtal/geos306/geos306.html>
- <https://www.southalabama.edu/geology/haywick/GY302/302-2.pdf>
- <https://ocw.mit.edu/courses/12-108-structure-of-earth-materials-fall-2004/pages/lecture-notes/>

**Course learning outcomes:**

- Students are expected to learn about the dynamic planet earth and the processes responsible for it.
- Students will understand the exogenic and endogenic processes responsible for the earth's landscape.

  
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### Geology Lab-I: Earth System Science (ESS)

- Draw the Physical divisions of India and Rajasthan in respective maps.
- Draw distribution of earthquakes and major mountains in map of the world and India.
- Geological Time Scale
- Earth internal structure
- Draw landforms of rivers, wind, glaciers and volcanoes.
- Study of physical models showing geomorphic features.
- Configuration and Numbering of topographic maps on various scales.
- Interpretation of various geomorphic landforms and drainage patterns on toposheet.
- Map exercise related to plotting of major mountain ranges, lakes and rivers of India & seismic data on map of India.

#### Crystallography & Mineralogy-

- Description and Identification of the following minerals in hand specimen and under microscope- Quartz, Feldspar, Muscovite, Biotite, Chlorite, Hornblende, Augite, Olivine, Garnet, Kyanite, Staurolite, Sillimanite, Tremolite, Asbestos, Serpentine, Calcite, Dolomite, Magnetite, Hematite, Epidote, Tourmaline, Beryl, Talc, Gypsum, Apatite, Fluorite, Topaz & Corundum.
- Drawing and description of axes of crystal systems and symmetry elements of their classes.
- Drawing, description and identification (of system, class & forms) of crystal models.
- Clinographic projection of crystals of Cubic System.
- Determination of specific gravity of minerals.

#### Books suggested for reading:

- Holmes, Arthur., 1992, Principles of Physical Geology, Chapman and Hall, London.
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- Deer, W. A., Howie, R. A., and Zussman, J., 1992, An introduction to the rock-forming minerals (Vol. 696). London: Longman.

#### Course learning outcomes:

- Students will be able to identify various landforms and structural features and understand the mechanism responsible for them.