

**Govind Guru Tribal University, Banswara**  
**Details of Discipline Centric Core and Elective Courses for freshers**  
**who will be admitted in the session 2023-24**

(Separate sheet to be used for each discipline/subject)

Name of University: Govind Guru Tribal University, Banswara

Name of Faculty(ies) : SCIENCE

Name of Discipline/Subject: **GEOLOGY**

Three-Year Bachelor Degree Program								
#	Level	Semester	Type	Title	Credits			
					L	T	P	Total
1	5	I	DCC	EARTH SYSTEM SCIENCE	3	1	2	6
2	6	II	DCC	MINARAL SCIENCE	3	1	2	6
3	6	III	DCC	PETROLOGY	3	1	2	6
4	6	IV	DCC	PALAEONTOLOGY AND STRAITGRAPHY	3	1	2	6
5	7	V	DSE	HYDROLOGY	3	1	2	6
6	7	VI	DSE	STRUCTURAL GEOLOGY	3	1	2	6

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कक्षा सचिव  
गोविन्द गुरु त्रिभुजातीय विश्वविद्यालय  
बंसवाड़ा (राजस्थान)



# GOVIND GURU TRIBAL UNIVERSITY BANSWARA

## B.Sc. Geology Three Year Graduate Course Semester I DCC EARTH SYSTEM SCIENCE (ESS)

### Unit 1 Introduction to Earth as Planet

Holistic understanding of Earth as a dynamic planet. Introduction to various branches of Geology. General characteristics and origin of the Universe, Solar System, and its planets. The terrestrial and jovian planets. Meteorites and Asteroids. Earth in the solar system - origin, size, shape, mass, density, rotational and revolution parameters, and its age. Geological Time Scale.

### Unit 2 Interior and Exterior of Earth's Surface

Formation of core, mantle, crust, hydrosphere, atmosphere, and biosphere Convection in Earth's core and production of its magnetic field. The mechanical layering of the Earth. Concept of Plate Tectonics, Sea-Floor Spreading, and Continental Drift. Geodynamic elements of Earth- Mid Oceanic Ridges, trenches, transform faults, and island arcs. Origin of oceans, continents, mountains, and rift valleys. Earthquake and earthquake belts. Volcanoes- types, products, and their distribution.

Introduction to Geomorphology. Endogenic and Exogenic processes. Weathering and associated landforms and Hill slopes, Glacial, Periglacial processes and landforms, Fluvial processes and landforms, Aeolian Processes and landforms, and Coastal Processes and landforms.

### **Unit 3 Fundamentals of Structural Geology and Hydrogeology**

Fundamentals of Structural Geology: Concept of strike and dip. Description and applications of clinometer compass. Primary sedimentary structures: Types of Bedding. Igneous structures. Metamorphic structures: Foliation, Cleavages. Definition and Classification of Fold, Fault, Joint, Lineations, and Unconformity. Description of Stress, Strain, Outliers, Inliers, Overlap and Offlap

Definition of hydrogeology, Hydrological cycle; Hydrological parameters - Precipitation, evaporation, transpiration, and infiltration. Origin of groundwater; Vertical distribution of groundwater, Types of aquifers; Water bearing properties of rocks - Porosity and Permeability; specific yield, specific retention. Groundwater provinces of India. Groundwater quality.

#### **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 textbook 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.

#### **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)

#### **Course learning outcomes:**

- Students are expected to learn about the dynamic planet Earth and the processes responsible for it.
- Students will be understanding the exogenic and endogenic processes responsible for the earth's landscape.
- Students will also appreciate the role of rock parameters in the field of hydrogeology and structural geology.



# GOVIND GURU TRIBAL UNIVERSITY BANSWARA

## B.Sc. Geology Three Year Graduate Course Semester I

### DCC

#### Lab-I EARTH SYSTEM SCIENCE (ESS)

- Draw the Physical divisions of India and Rajasthan on respective maps.
- Draw the distribution of earthquakes and major mountains on the 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 the plotting of major mountain ranges, lakes, and rivers of India & seismic data on the map of India.
- Measurement of strike and dip
- Identification of structural features in hand specimens

#### 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 textbook 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.

**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)

**Course learning outcomes:**

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

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# GOVIND GURU TRIBAL UNIVERSITY BANSWARA

## B.Sc. Geology Three Year Graduate Course Semester II DCC Mineral Science

### Geology-II: Mineral Science

#### **Unit 1 Fundamentals of Crystallography**

Crystal-Concept of Crystalline and non-crystalline substances; Interfacial angle and external morphology in relation to internal structures; Crystal parameters and indices; form and zone. Crystal symmetry, classification of crystals into systems. Hermann-Mauguin symbol, Holohedrism, hemihedrism hemimorphism, and enantiomorphism. Study of axial relationship, symmetry elements, and forms present in the different normal classes. Fundamentals of stereographic projection of crystals and their uses. Twinning and Twin Laws: common types of twins and their examples in minerals.

#### **Unit 2 Fundamentals of Mineralogy**

Scope of mineralogy. chemical bonding and compound formation. Definition and classification of minerals. Physical properties of minerals; isomorphism and polymorphism. Silicate structure and its classification. Nature of light - wave theory of light, reflection, refraction, polarisation, double refraction. Introduction to the petrological microscope. Optical properties of minerals - isotropic and anisotropic minerals, refractive index and optical indicatrix, pleochroism, and pleochroic scheme; extinction and interference figures.

Study of atomic structure, chemistry, physical, optical properties, and uses of minerals of Olivine, Feldspar, Pyroxene, Amphibole, Garnet, and Mica groups.

#### **Unit 3 Properties and genesis of Minerals**

Physical and chemical characteristics, optical properties, and uses of metallic minerals of Lead, Zinc, Copper, and Iron.

Importance of Crustal evolution in the metallogenesis; Metallogenic epochs and provinces.

Magma and its relation with mineral deposits. Elementary ideas of magmatic concentration and hydrothermal process. Elementary ideas of processes of ore formation by Sedimentation, Volcanogenic, Evaporation, Oxidation and Supergene Enrichment, Metamorphism, Mechanical, and Residual Concentration.

Mineralogy, and genesis of bauxite, iron ore, copper, lead-zinc, chromite and manganese deposits of India.

#### Books suggested for reading:

- Klein, C., Dutrow, B., Dwight, J. and Klein, C., 2007, The 23rd 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.
- Jensen, M. L. and Bateman, A. M., Economic Mineral Deposits, John Wiley & Sons, Singapore

#### Suggested E-resources:

- <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/ekkeynaklar?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 will get the idea of a broad overview of both minerals and ore-forming minerals and their application to differentiate between minerals and to imagine the crystals in three dimensions.
- Students will be understanding the ore deposits.



# GOVIND GURU TRIBAL UNIVERSITY BANSWARA

## B.Sc. Geology Three Year Graduate Course Semester II DCC Mineral Science Geology-II: Mineral Science

### Geology Lab-II: Mineral Science

- Representation of crystal models with respect to axis, symmetry, and forms.
- Identification and description of rock-forming minerals in hand specimens: Quartz, Feldspar, Muscovite, Biotite, Hornblende, Augite, Olivine, Garnet, Kyanite, Tremolite, Tourmaline, Beryl, Nepheline, Fluorite and Corundum.
- Microscopic identification of minerals; Olivine, Pyroxene, Garnet, Feldspar, Biotite, Muscovite. Scheme of pleochroism and absorption of a given mineral in thin section.
- Identification and description of important ore minerals and rocks in hand specimens. Plotting of important economic mineral deposits in the outline map of India.
- Identification of some important ore minerals Hematite, Chalcopyrite, Pyrite, Cuprite, Magnetite, Chromite, Arsenopyrite, Galena, Sphalerite, Pyrrhotite, Bauxite, Magnesite, and other important ore minerals (metallic and non-metallic) in hand specimen with particular emphasis on texture and structure.

### Books suggested for reading:

- Berry, L.G., Mason, B. and Dietrich, R.V., 1985, Mineralogy: Concepts, Descriptions and determinations, CBS.
- Dana, E.S. and Ford, W.E., 2002, A textbook of Mineralogy (Reprint).
- Deer, W.A., Howie, R.A. and Zussman, J., 2013, An Introduction to the rock-forming minerals, ELBS.
- Gribble, C.D., 2005, Rutley's Elements of Mineralogy, Springer.



- Kerr, P.F. and Hill, Grew, M.C., 1977, Optical Mineralogy.
- Nesse, D.W. and Hill, Grew, M.C., 1986, Optical Mineralogy.
- Perkins, D., 2013, Mineralogy, Prentice Hall.
- Phillips, F.C., 1971, Introduction to Crystallography, Longman Group Publication.
- Krishnaswamy S., 1988, India's Mineral Resources, Oxford & IBH Publishing Co. Pvt. Ltd., (Revised by R. K. Sinha) New Delhi. 1988.
- Shrivastava, J.P., Introduction to Ore microscope.
- Bernhard, Precejus., The Minerals under the Microscope, An optical guide (ISSN Book 3) 1st Edition.

**Suggested E-resources:**

- <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:**

- After the successful completion of this practical course, the students will be able to identify various rock-forming and ore-forming minerals based on their physical and optical properties.

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