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(Accredited by NAAC with Grade A+)

GU/Acad –PG/BoS - GU-ART /2025-26/691 Date: 09.01.2026

CIRCULAR

The syllabus of the Goa University–Admission Ranking Test (GU-ART) for **Master of Science in Applied Geology** and **B.Ed. in Applied Geology** Programmes, approved by the Standing Committee of the Academic Council in its meeting held on 24th & 25th November 2025 is attached.

The Dean/Vice-Dean (Academic) of the School of Earth, Ocean and Atmospheric Sciences and the Principals of all the affiliated Colleges are requested to take note of the above and bring the contents of this Circular to the notice of all concerned, including students aspiring to pursue the Master's Programmes.

ASHWIN V LAWANDE
Digitally signed by ASHWIN V LAWANDE
Date: 2026.01.09 16:08:33 +05'30'

(Ashwin V. Lawande)
Deputy Registrar – Academic

To,
1. The Dean, School of Earth, Ocean and Atmospheric Sciences, Goa University.
2. The Vice-Dean (Academic), School of Earth, Ocean and Atmospheric Sciences, Goa University.
3. Principals of all the affiliated Colleges.

Copy to:
1. Controller of Examinations, Goa University.
2. Assistant Registrar (Admissions), Goa University.
3. Assistant Registrar Examinations (UG/PG), Goa University.
4. Director, Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

GOA UNIVERSITY

SYLLABUS FOR GOA UNIVERSITY-ADMISSIONS RANKING TEST (GU-ART) FOR MASTER'S & B.Ed. IN APPLIED GEOLOGY PROGRAMMES

Effective from AY: 2026-27

Modules	Content
Module 1:	**Introduction to Geology and Mineralogy**
	Introduction to Geology: Applications and career opportunities in Geosciences, Origin of the Earth (Nebular Hypothesis), Shape, Size, Structure of the Earth, Introduction to Plate Tectonics, Introduction to Planetary Geology. The Earth System: Atmosphere (structure and composition), Hydrosphere (occurrence and distribution of water, hydrological cycle), Biosphere (evolution of life through geologic time), Cryosphere, and Geosphere (minerals and rocks). Scope and importance of petrology. Elementary Crystallography and Mineralogy: Scope and importance, states of matter, crystalline state, atomic arrangement in crystals. Introduction to mineralogy: definition of a mineral, Physical properties of minerals: color, streak, luster, diaphaneity, cleavage, fracture, form, habit, hardness, specific gravity, and electrical and magnetic properties. Introduction to common rock-forming minerals: quartz, feldspar, micas, pyroxenes, amphiboles, and olivine. Uses of minerals. Classification of Minerals: Silicates and Non-silicates. Opaque and transparent minerals. Structure of silicate minerals—nesosilicates, sorosilicates, inosilicates, cyclosilicates, phyllosilicates, and tectosilicates.
Module 2:	**Petrology and Structural Geology**
	Rocks: Classification into igneous, sedimentary, and metamorphic; the rock cycle. Igneous Rocks: Plutonic, hypabyssal, and volcanic types, forms, structures, textures, Bowen's Reaction series, classification based on grain size and mineral composition, and mineralization. Sedimentary Rocks: Structures, textures, classification, depositional environments. Metamorphic Rocks: Agents of metamorphism, types of metamorphism, fabric, and classification. Contours, contour reading, and contour patterns; scale and compass bearing; stratification; strike; dip (true and apparent dip); and strike and dip symbols. Folds: causes and geometric classification of folds; importance of folds. Joints: Geometric classification, importance; Faults: general characteristics, geometric classification and importance, Horst,

Approved by: Standing Committee of the Academic Council on 24th & 25th November 2025

	Graben, and Thrust faults. Unconformities: stages of development, types, and importance of unconformities; outliers and inliers. Earthquakes: Seismic waves, Magnitude (Richter Scale), Intensity (Mercalli Scale), Types of Earthquakes (shallow, intermediate, deep); Tsunamis: mode of origin; Volcanoes: Types and distribution, Ring of Fire.
Module 3:	**Stratigraphy and Geology of Goa**
	Stratigraphy: scope and importance; Principles of Stratigraphy: Laws of uniformitarianism, original horizontality, order of superposition, faunal succession, cross-cutting relationship, inclusions; Correlation and methods of correlation: structural relations (tectonic criteria), lithological similarity (marker horizon or key bed), and paleontological criteria (index fossils). Standard Stratigraphic timescale; Indian stratigraphic timescale; Geological Time Units: - Eon, Era, Period, Epoch, Age, Phase. Chronostratigraphic Units: - Erathem, System, Series, Stage, and Zone. Lithostratigraphic Units: - Group, Formation, Member, Bed, and Laminae. Relative and Absolute Age. Radiometric Dating. Physiography and Drainage of Goa. Supracrustals of Goa, Shimoga-Goa Schist Belt, lithostratigraphic Classification of supracrustal rocks of Goa: Barcem Group and Ponda Group. Correlation of Goa Group to Dharwar Supergroup. Goa Group: environments of deposition, Komatiitic ultramafics, Granitic gneisses, late intrusive granites, mafic intrusive rocks, laterites, and recent sands. Bondla mafic-ultramafic complex: petrography. Structure of the Goa Group of rocks. Economic deposits of Goa: age, regional structure, ore types, mineralogy, and grade of ore.
Module 4:	**Paleontology and Physical Geology**
	Fossils: Definition and types: Mega fossils (dinosaurs), Microfossils, Ichnofossils; Conditions for fossilization; Modes of preservation of organic remains: Biologic, mechanical and chemical destruction; Factors limiting distribution of organisms: sunlight, depth of water, oxygen, seawater temperature, salinity, substratum & food. Modes of fossilization; Derived fossils; transported fossils; Index fossils and Endemic fossils; Uses of fossils; Introduction to taxonomy and species concept. Weathering and Erosion: Mechanical Weathering, Chemical Weathering, Biological Weathering. Agents of Transportation—Wind, Water, Glaciers, Gravity, Modes of transportation—bed load (sliding, rolling, saltation), suspension, dissolved load, and factors affecting deposition. Geological work of wind: generation of winds, types, and characteristics of deserts. Desert Landforms: Depositional: sand dunes, and loess; Erosional: grooves, ventifacts & yardangs, mushroom rock, inselbergs, mesas, and buttes. Geological work of groundwater: Erosion: Karst Topography—Caves, Sinkholes, Solution Valleys. Deposition: Stalactites, Stalagmites. Geological work of the river: Drainage patterns. Erosion by River: Erosional Features - Steep Valleys, Gorges, Potholes, Waterfalls, Meanders, Ox Bow Lake,. Depositional Landforms by River: Floodplains, Deltas, and Alluvial Fans. Geological work of Oceans and

	Seas: Erosional Features - Sea-cliffs, wave-cut platform, sea-arches, sea-caves, sea-stacks.
References/ Readings:	1. Holmes, A. (2013). *Principles of Physical Geology*. Routledge. 2. Klein, C., & Hurlbut, C. S. Jr. (2021). *Dana Manual of Mineralogy*. Wiley. 3. Mukherjee, P. K. (2013). *A Textbook of Geology*. World Press. 4. Kumar, R. (1985). *Fundamentals of Historical Geology and Stratigraphy of India*. 5. Berry and Mason: *Mineralogy*. CBS Publ. and Distr. 6. Deer, W. A., Howie, R. A., & Zussman, J. (1978). *Rock-forming Minerals: Feldspars, Volume 4A*. Geological Society of London. 7. Perkins, D. (2013). *Mineralogy: Pearson Higher Ed*. 8. Rutley, F. (2012). *Rutley's Elements of Mineralogy*. Springer Science & Business Media. 9. Arogyaswamy, R. N. P. (1973). *Courses in Mining Geology*. III Edition, Oxford and IBH publication Co. 10. Billings, M. P. (1954). *Structural Geology*. 11. Plummer, C. C., Carlson, D. H., & McGeary, D. (2007). *Physical Geology*. 12. Dessai, AG. (2018). *Geology and Mineral Resources of Goa*. New Delhi Publishers. 13. Gokul, A. R. (1985). *Structure and Tectonics of Goa*. In: Proceedings of the Seminar on Earth's Resources for Goa's Development, Geological Survey of India, 14–21. 14. Gokul, A. R., Srinivasan, M. D., Gopalkrishnan, K. and Vishwanathan, L. S. (1985). *Stratigraphy and Structure of Goa*. In: Proceedings of the Seminar on Earth's Resources for Goa's Development, Geological Survey of India, 1-13. 15. *Natural Resources of Goa – A Geological Perspective*, Geological Society of Goa (2009). 16. Kesavulu C. (2009). *A Textbook of Engineering Geology*, Macmillan publishers. 17. Singh P. (2013). *Engineering and General Geology*. Katson books.