



MAHATMA GANDHI UNIVERSITY, KERALA

**Abstract**

Ph.D. Programme - Geology - Course II of Course Work - Preparation of Syllabus - Broad area of Research - Approved - Orders Issued.

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**ACADEMIC A 10 SECTION**

No. 5818/AC A 10/2024/MGU

Priyadarsini Hills, Dated: 28.06.2024

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- Read:-* 1. Mahatma Gandhi University Ph.D Regulations 2016  
2. U. O. No. 4377/AC A10/2024/MGU dated 27.05.2024.

**ORDER**

Sanction has been accorded by the Vice-Chancellor to the following syllabus of Course II of the Course Work Examination (Broad Area of Research) for research scholars in Geology, registered in Approved Research Centres, from 2023 Admission onwards.

**Syllabus of Course II - Trends Geology**

**Module I: Atmosphere and Climate**

Atmosphere: Composition and structure of the atmosphere, Layered structure of the atmosphere, Atmospheric pressure patterns and Pressure belts. Atmospheric circulation patterns and wind belts. Climate: Classifications of climate, Koppen's classification, Thornthwaite's classification and Trewartha's classification. Climatic groups based on temperature criteria, Climatic groups based on precipitation criteria. Climatic Types and their Distribution. Global Climatic Changes: Climatic changes through geological time, Quaternary Ice Ages.

**Module II: Geochemistry**

Basic principles in geochemistry: Geochemical environment, surficial and deep-seated environment, geochemical cycle, geochemical dispersion, - primary and secondary dispersion, dispersion halos, geochemical mobility, geochemical reactions, association of elements, indicator elements, pathfinder elements, patterns of geochemical distribution, background value, geochemical anomaly, significant and no-significant anomaly, threshold.

### **Module III: Hydrology**

Meaning, scope and development of hydrology; hydrological cycle; precipitation types, characteristics and measurements; Evaporation: factors affecting evaporation from free water surface and soil; Evapotranspiration: estimation and its control. Soil moisture and its zones, infiltration; Groundwater: occurrence, storage, recharge and discharge; Runoff: its sources and components, factors affecting runoff; Darcy's law, River regimes; Hydrograph.

### **Module IV: Remote sensing and GIS**

Concept and foundations of remote sensing: Introduction, energy sources and radiation principles, energy interactions in the atmosphere, energy interaction with earth surface features – Spectral Reflectance of Vegetation, Soil, and Water, Spectral Response Patterns, Atmospheric Influences on Spectral Response Patterns. Data Input and Editing in GIS – Data Sources, Metadata, Vector data model – points, lines and polygons. Vector features and attribute tables – Relational Database Management Systems. Raster data model – cell dimensions, vector vs raster, raster to vector & vector to raster conversion. Data structures for elevation data: TIN, DEM. Map registration – Geo referencing, GCPs, Coordinate Conversion, Data Editing – Digitizing, Attributing, Basic vector analysis- Clip, Buffer, Merge, Intersect, etc. Terrain analysis: contours, slope, aspect, curvature, flow direction, pits, watershed, drainage network, viewshed, shaded relief map

### **Module V: Geoexploration**

Stages of geological exploration; scope, objectives and methods of prospecting, regional exploration and detailed exploration; geological, geochemical and geobotanical methods; litho-, bio-, soil geochemical surveys, mobility and dispersion of elements, geochemical anomalies; ore controls and guides; pitting, trenching, drilling; sampling, assaying, ore reserve estimation; categorization of ore reserves; geophysical methods- ground and airborne surveys; gravity, magnetic, electrical and seismic methods of mineral exploration.

### **References**

1. Barry R.G. and Chorley R.J. (2003) Atmosphere, Weather and Climate. Routledge.
2. Battarbee W. and Binney H.A. (Ed) (2008) Natural Climate variability and Global warming –A Holocene Perspective. Wiley Blackwell.
3. Chorley, R. J. (1995): Atmosphere, Weather and Climate. Methuen and Company, London.
4. DeMers M. N. (2009) GIS for dummies. Wiley, NJ, 388p.
5. Kearey P. and Brooks M. (1991) An Introduction to geophysical Exploration. Blackwell 272p.
6. Krisch R. (2006) Groundwater Geophysics- A tool for hydrogeology. Springer Berlin 548p.
7. Lillesand T.M., Kiefer R.W. and Chipman J.W. (2004) Remote sensing and image

interpretation, Fifth Edition, Wiley, NJ, 812p.

8. Mason B., Moore C.B. (1982) Principles of geochemistry. John Wiley & Sons, New York,344p.
9. Ward, R.C. and Robinson, M. (2000): Principles of Hydrology. McGraw Hill, New York.

Orders are issued accordingly.

MINIMOL K ZACHARIAS

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(ACADEMIC)  
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