

**STRUCTURE OF FOUR-YEARS UNDERGRADUATE PROGRAMME (FYUGP) IN
GEOLOGY FOR TWO MINORS AFFILIATED COLLEGES UNDER
RABINDRANATH TAGORE UNIVERSITY AS PER NEP-2020**

SEMESTER	COURSE(MINOR)	CREDIT	LEVEL	MARKS
3 rd	Paper- Geomorphology and Environmental Geology Code-MIN-GLG-3.2	4	200	100
4 th	Paper- Earth and Climate Code-MIN-GLG-4.2	4	200	100
5 th	Paper- Fuel Geology Code-MIN-GLG-5.2	4	200	100
6 th	Paper- Oceanography Code-MIN-GLG-6.2	4	200	100

FOUR YEAR UNDERGRADUATE PROGRAMMES (FYUGP)
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1. Four Year Undergraduate Programmes (FYUGP)
2. Subject: Geology (MINOR-3)
3. Semester: Third Semester
4. Course Name: Geomorphology and Environmental Geology
5. Paper Code: MIN-GLG-3.2
6. Course level: 200
7. Credit:4(Th-3, Pract-1)

Course Outcome: *The students will be able to learn the Endogenic and Exogenic processes for landscape development. In practical course students will learn about preparation of topographic profile, morphometry of drainage basin, identification of morphological features from the models,*

Syllabus showing each unit against class number and marks

Unit No.	Unit Content	Class hours	Credit/Marks
Unit-1	Geomorphology: Definition and scope of geomorphology; Endogenic and Exogenic processes; Geoid, Topography, Hypsometry, Global Hypsometry; Overview of Indian Geomorphology, Extraterrestrial landforms.	15	25
Unit-2	Endogenic Processes: volcanic processes and tectonic processes. Exogenic Processes: weathering, glacial, fluvial, aeolian and associated landforms. Landforms associated with igneous activities	15	25
Unit-3	Environmental Geology: Definition and scope of Environmental Geology; Natural and anthropogenic environmental hazards; Causes of landslide and flood and their impact on environment; Impact of mining on environment; Earthquake hazards	15	25
Unit-4	Practical: Reading of topographic maps, Concept of scale preparation of a topographic profile, Morphometry of drainage basin, Identification of morphological features from the models.	30	25

SUGGESTED READINGS:

- 1) Bloom A.L., (1998). Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Pearson Education.
- 2) Esterbrook D.J., (1992). Surface Processes and Landforms, MacMillan Publ.
- 3) Kale, V.S. and Gupta A. (2001). Introduction to Geomorphology, Orient Longman Ltd.
- 4) Holmes' Principles of Physical Geology. 1992. Chapman & Hall.
- 5) Patwardhan, A. M., The Dynamic Earth System, PHI Learning.
- 6) Environmental Geology (Indian Context)—K.S.Valdiya; Tata McGroaw-Hill Publishing Company Ltd.

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1. Four Year Undergraduate Programmes (FYUGP)
2. Subject: Geology (MINOR-4)
3. Semester: Fourth Semester
4. Course Name: Earth and Climate
5. Paper code: MIN-GLG-4.2
6. Course level: 200
7. Credit:4(Th-3, Pract-1)

Course outcome: *The students will be able to learn the components of the climate system, heat budget of the earth, Global Oceanic conveyor belt and its control on Earth's climate, Natural verses Anthropogenic effects, Human and Climate change, Mechanism of monsoon and effects of monsoon.*

In practical course students will learn about the distribution of major climatic regimes of India on map, Distribution of major wind patterns on World map.

Syllabus showing each unit against class number and marks

Unit-1	<p>Climate system: Components of the climate system, Climate controlling factors, Climate system response, Response rate, Feedbacks in climate system.</p> <p>Heat Budget of Earth: Incoming solar radiation, receipt and storage of heat, Heat transformation, Earth's heat budget.</p>	15	25
Unit-2	<p>Atmosphere-Hydrosphere: Layering of atmosphere and atmospheric circulation, Atmosphere and Ocean interaction and its effect on climate, Heat transfer in ocean, Global Oceanic conveyor belt and its control on Earth's climate, Sea ice and glacial ice.</p>	15	25
Unit-3	<p>Climate Change: Natural verses Anthropogenic effects, Human and Climate change, brief introduction to archives of climate change.</p> <p>Monsoon: Mechanism of monsoon, Monsoonal variation through time, Factors associated with monsoonal intensity, Effects of monsoon.</p>	15	25
Unit-4	<p>Practical: Study of distribution of major climatic regimes of India on map, Distribution of major wind patterns on World map, Numerical exercises on interpretation of proxy records for paleoclimate.</p>	30	25

SUGGESTED READINGS:

1. Rudiman, W.F., 2001. Earth's climate: Past and Future. Edition 2, Freeman Publisher
2. Rohli, R.V., and Vega, A.J., 2007. Climatology Jones and Barlett
3. Lutgens, F. Tarbuck, E., and Tasa, D., 2009. The Atmosphere: An Introduction to Meteorology. Pearson Publisher

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1. Four Year Undergraduate Programmes (FYUGP)
2. Subject: Geology (MINOR-5)
3. Semester: Fifth Semester
4. Course Name: Fuel Geology
5. Paper code: MIN-GLG-5.2
6. Course level: 200
7. Credit:4(Th-3, Pract-1)

Course Outcome: This course includes study of the mechanism of hydrocarbon generation from organic material. The students will learn the relationship between temperature, pressure and other physical parameters and its effect on distribution and migration of hydrocarbons. The students will get a clear idea about the coal and oil fields of north east India, fundamentals of coal and coal forming sedimentary environments. The students will also learn about the lithotypes, microlithotypes, maceral concept and its classification, origin of macerals.

In practical course students will be able to identify different types of coal; lithotypes in coal, determination of calorific value from results of proximate and ultimate analyses of coal, determination of kerogen types using Van Krevelen diagram, Interpretation of Wire-line logs the Panel and Fence diagrams.

Syllabus showing each unit against class number and marks

Unit No.	Unit Content	Class hours	Credit/Marks
Unit-1	Coal: Definition, origin and Ranks of Coal; Classification of coal; Chemical composition of coal: proximate analysis and ultimate analysis. Fundamentals of Coal petrology-macro petrographic constituents of Coal, lithotypes, microlithotypes, macerel Coal Bed Methane, gasification, liquefaction; distribution of coal in India with special reference to NE India.	15	25
Unit-2	Petroleum: Definition of source rocks, reservoir rocks, seal/cap rocks and their types; Kerogen types; Origin of petroleum, petroleum traps and their types. Migration of oil-primary and secondary; occurrence of Petroleum in Assam-Arakan basin.	15	25
Unit-3	Other fuels: Gas hydrates - its distribution, complexities associated with exploitation of gas hydrates, shale oil and gas - tight reservoirs, hydro-fracturing and production of shale oil and gas. Nuclear fuels - types, geological distribution and exploration for nuclear fuels.	15	25
Unit-4	Practical: Study of hand specimens of coal; identification of lithotypes in coal; determination of calorific value from results of proximate and ultimate analyses of coal. Determination of kerogen types using Van Krevelen diagram; Interpretation of Wire-line logs. Panel and Fence diagrams.	30	25

SUGGESTED READINGS:

- 1) Thomas, L (2002). Coal Geology. Willey.
- 2) Chandra D. (2007). Chandra's Textbook on applied coal petrology. Jijnasa Publishing House.
- 3) Shelly R. C. and Sonnenbergm, S. A. (2022). Elements of Petroleum geology: 4th Edition, Academic Press.
- 4) BJORLYKKE, K. (1989). Sedimentology and petroleum geology. Springer-Verlag.
- 5) Beaumont, E. A. and Foster, N. H. (2000). AAPG Treatise of Petroleum Geology: Exploring for Oil and Gas Traps. AAPG.
- 6) Bahardori, A. and Zendejboudi, S. (2016). Shale Oil and Gas Handbook: Theory, Technologies, and Challenges. Gulf Professional Publishing.
- 7) Thakur, P., Schatzel, S., Aminian, K., Rodvelt, G., Mosser, M. and D'Amico, J. (2020). Coal Bed Methane: theory and applications. Elsevier.
- 8) Aswathanarayana, U. (1986). Principles of Nuclear Geology. Balkema.

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1. Four Year Undergraduate Programmes (FYUGP)
2. Subject: Geology (MINOR-6)
3. Semester: Sixth Semester
4. Course Name: Oceanography
5. Paper code: MIN-GLG-6.2
6. Course level: 200
7. Credit:4(Th-3, Pract-1)

Course Outcome: *This course provides integrated understanding of Oceanography and other branches of Science. This course also provides knowledge about the morphology of the ocean bottom. The students will be able to know about the marine deposits and also the Coral Reefs. The course provides the knowledge about the Marine Energy Resource; Marine Food Resource; the Fishing Industry; Marine Pollution and Mitigation.*

In Practical class the students will be able to know Major Physiographic divisions of the Ocean Floor, major ocean currents of the World; Bathymetric Map Reading, distribution of Marine sediments of the World.

Syllabus showing each unit against class number and marks

Unit No.	Unit Content	Class hours	Credit/Marks
Unit-1	<p>Definition and scope: Definition, scope and branches of Oceanography; Names of oceans, boundaries, and importance of the oceans; Oceanography and other related subjects.</p> <p>Morphology of the Ocean Bottom: Hypsometric Curve, Origin of Continental shelf, slope and sub-marine canyons,</p> <p>Temperature of the Oceans: Sources of heat; Surface temperature of the ocean water, factors affecting the horizontal distribution of surface temperature of the ocean</p>	15	25
Unit-2	<p>Marine Deposits: Classification of marine sediments; Sources of Marine Deposits; Sediment texture; Organic and carbonic deposits.</p> <p>Coral Reef: Distribution of Coral Reefs; Conditions of coral growth; Types of coral Reefs; Application of Physiographic to the Coral Reef Problem by Davis</p>	15	25
Unit-3	<p>Ocean Currents: General characteristics and Origin of Ocean Currents; Causes of Ocean Currents; Types of Ocean Currents; Surface ocean currents and Fishing Grounds;</p> <p>Man and Marine Resources: Marine Energy Resource; Marine Food Resource; The Fishing Industry; Marine Pollution and Mitigation</p>	15	25

Unit-4	Practical: Study of Major Physiographic divisions of the Ocean Floor; Exercises on major ocean currents of the World; Identification of Coral Reefs; Plotting of distribution of Marine sediments on the World Map (areas of Terrigenous, Biogenous and Pelagic sediments)	30	25
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SUGGESTED READINGS:

- 1) Siddhartha, K (2016). Climatology Atmosphere, Weather and Climate. Kitab Mahal
- 2) Singh, Savindra. Climatology, Pravalika
- 3) Lal, D.S. (2001). Climatology. Sharda Pustak Bhowan
- 4) V, Roberlt, Rohit. Climatology. Jones and Bartlett Publishers, Inc
- 5) Barry , G Roger and Chorlay, J Richard, 9th Edition. Taylor and Francis, Routledge
- 6) Trewai, G.F, Principles of Climatology. 2nd Edition. McGraw Hill
- 7) Mather, J.R.(1990). Climatology. McGraw Hill
- 8) Hartmann, Dennes L(2016). Global Physical Climatology