SEMESTER 1stFA
MAJOR / MINOR COURSE

GLY122M GEOLOGY (FUNDAMENTALS OF GEOLOGY)

CREDITS: (4+2)

OBJECTIVE/EXPECTED LEARNING OUTCOMES:

The study of this course will strengthen student's knowledge with respect to understanding the essentials of the structural dynamics of the earth. The students will understand the origin of our solar system and planets, including earth. The students will understand the different surface processes and geomorphological features and their development. Besides, studying the basics of mineralogy will help the students in understanding and building the overall knowledge in Geology.

THEORY (04 CREDITS)

UNIT-1 (16 HOURS)

Introduction to the science of geology: Definition, branches, scope and importance, History of Geology origin and evolution of Geological thoughts; Modern theories about the origin of the solar system; Origin of the Earth exogenous and endogenous process. Relation with other branches of sciences; Role of physics, chemistry, and paleobiology in the development of ideas about the earth. Role of Physics in crystallography, gravity, geomagnetism, isostasy, earthquakes and microscopy. Role of Chemistry in chemical bonds, crystal chemistry, solution chemistry, chemical energetic, introduction to fossils.

UNIT-2 (16 HOURS)

Fundamental concepts: Catastrophism, uniformitarianism, Davis cycle of erosion, and base level of erosion. Weathering: definition and types, agents of weathering. Epeirogenesis and orogenesis. Mountains and types. Volcanoes: types, distribution, and eruptional features. Glaciers: Definition and types, snowline, glacial movements, and crevasses. Geological work of glaciers: Erosion and deposition. Aeolian processes: erosional and depositional features. Geological work of river: erosional and depositional features. Drainage patterns. Karst topography: Surface and sub-surface features. Structural landforms: Definition and types, Inversion of topography. Climate and landforms. Soils: Soil formation, Soil profiles. Oceans: Topography of seafloor. – Continental shelves, slope, abyssal plains, Ocean ridges, submarine valleys, canyons, deep-sea trenches, and guyots. Oceanic erosion and deposition. Coral reefs and types.

UNIT-3 (16 HOURS)

Introduction to rocks and minerals: Rocks as natural mineral aggregates; types of rocks: igneous rocks; sedimentary rocks; metamorphic rocks. Preliminary knowledge about the most common rock-forming and economic minerals. Structure of earth: physical properties. Geology as the history of Earth: How the rocks record history, Geological Time Scale, Mineralogy and the texture, Structures, introduction to paleoclimate and paleogeography, Surface relief of the earth, Topography of sea floor. Various Geospheres.

UNIT-4 (16 HOURS)

Mineralogy: Definition, scope, and classification of silicate minerals and ore-forming minerals. Scalar and vector properties of minerals. Moho's scale of hardness. Physical properties and mode of occurrence: Quartz, Feldspar, Mica, Amphibole, Pyroxene, Olivine, Garnet, Chlorite, and Carbonate. Optical Mineralogy: Polarizing microscope, mechanism of polarization and interference of light, use of accessory plates. Elements of optics, isotopic medium, anisotropic medium, refractive index, Snell's law of critical angle, Optical indicatrix: isotropic, uniaxial, and biaxial. Pleochroism and Birefringence. Optical properties of minerals under plane-polarized and cross-polarized light: Forms, cleavage, fractures and parting, refractive index and relief, Becke line and its use.

PRACTICAL (02 CREDITS)

Field work 15 Marks (7 days in a semester)
Field Work: Study of landforms, erosional and depositional features. Handling of Clinometer and Brunton compass for measuring dip and strike, and plotting of field data on toposheets.

Mineralogy: Study of the physical properties of important rock-forming minerals as included in the theory paper. Study of optical properties of important rock-forming minerals as included in the theory paper.

SUGGESTED READINGS:

Berry & Mason, 1988: Mineralogy.CBS Pub.
Burbank, D. W. and Anderson, R.S., 2001: Tectonic Geomorphology Blackwell Sciences
Dexter Perkin: Minerals in Thin Sections
Gribble, D. D., 1988: Rutley's Elements of Mineralogy, DBS Publications.
Holmes, A., 1996: Principles of Physical Geology, EUBS, Chapman.
Judson, S. and Kaufman, M. E., 1990: Physical Geology, Prentice Hall.
Kerr, P. F., 1984. Optical Mineralogy.
Lutgens, F. K. and Tarbuck, E. J., 1998: Essentials of Geology, Prentice Hall.
Phillips, Wm, R. and Griffen, D.T., 1986: Optical Mineralogy. CBS Edition.
Press, F. and Seiver, R., 1989: The Earth, W. H. Freeman.
Putnis, A., 2001: Introduction to mineral Science. Cambridge University Press.
Read, H. H., 1986: Rutleys Elements of Mineralogy.
Richard, V. G., 1997: Dana's new Mineralogy. John Wiley.
Ritter, D. F., 1978: Process Geomorphology. Wm. C. Brown Publishers,
Tarbuck, E. J. and Lutgens, F. K., 1997: Earth Science, Prentice Hall.
Terrly, G. W., 1958: Principles of Petrology, Mathuen.
Vishwas, S. K and Gupta, A., 2001: Introduction to Geomorphology Orient Longman.
S.N. Mathur, www.GSI. Govt. in (Field Manual of GSI)