Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NGLC503	**Methods of Structural Geology**	**3**	**0**	**0**	**3**

Course Objective

The primary objective of the course is to provide theoretical background for different structural techniques used in industry / exploration organisations.

Learning Outcomes

Upon completion of the course, students will be able to:

- Apply different methods to determine subsurface structural geometry.
- Interpret petrofabric diagrams.
- Identify and interpret geometry of folds.
- Analyse fractures and fracture controlled mineralisation.
- Determine shear sense in shear zones and carry out analysis of thrust belts.
- Analyse areas of extensional faults.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Methods of Subsurface Structural mapping:** Preparation and interpretation of structure contour, isopach and isochore maps. Stratigraphic sections and Fence diagrams. Preparation of cross sections of folds - concentric-arc method, kink-style construction, and dip-isogon method	6	Apply different methods to determine subsurface structural geometry.
2	**Tectonites**: different types and their significance. Petrofabric analysis. Relationship between deformation and metamorphism and criteria for recognition. Relative dating of orogenic belts	6	Interpret petrofabric diagrams.
3	**Structural Analysis**: Projection of fold geometry. Down-plunge projection of folds. Interference patterns in superposed folding and structural geometry in superposed folding. Behavior of lineations in superposed deformations. Use of foliations and lineations in tectonic analysis. Different phases of analysis, analysis of slate belts with simple and multiple deformations. Mapping in gneiss terranes. Migmatite complexes, reworking of basement rocks, mantled gneiss domes	12	Identify and interpret geometry of folds.
4	**Analysis of Fractures:** Fractures and fracture types. Joint-array Analysis and its significance. Fault-array Analysis. Lineament-Array analysis and its significance for regional exploration programme.	6	Analyse fractures and fracture controlled mineralisation.
5	**Analysis of Shear Zones:** different types, Shear zone rocks, Shear sense indictors. Concept of thrust belt geometry. Balanced cross-sections of thrust-belts. Applications of balanced cross-sections	6	Determine shear sense in shear zones and carry out analysis of thrust belts.
6	**Analysis of areas of growth faulting:** Structural characters, mechanisms of development, associated structures, and determination of depth to detachment.	3	Analyse areas of extensional faults.
7	Salt Domes and impact structures	3	Identify and interpret salt diapirs and impact structures
	Total	42	

Reference Books:

1. Badgley, PC (1965) Structural Methods for the Exploration Geologist. Oxford Book Company, Calcutta.
2. Davis, GH and Reynolds, SJ (1996) Structural Geology of Rocks and Regions (2nd Ed.). John Wiley & Sons.

Other References:

1. Ghosh, SK (1993) Structural Geology. Pergamon Press.
2. Groshong, RH, Jr. (2006). 3-D Structural Geology:A Practical Guide to Quantitative Surface and Subsurface Map Interpretation. Springer-Verlag, Berlin.
3. Marshak, S and Mitra, G (1988) Basic Methods of Structural Geology. Prentice Hall.
4. Ramsay, JG and Huber, MI (1987). The Techniques of Modern Structural Geology. Academic Press.
5. Roberts, J.L. (1982) Introduction to Geological Maps and Structures. Pergamon Press.
6. Roland, S.M., Duebendorfer, E.M. and Schiefelbein, I.M. (2007) Structural Analysis and Synthesis. Blackwell Publishing, Oxford
7. Tearpock and Bischke, R.E. (2003). Applied Subsurface Geological Mapping with Structural Methods (Second Edition). Prentice Hall PTR, New Jersey, 822p.
8. Twiss, RJ and Moores, EM (1992). Structural Geology. W. H. Freeman & Company.
9. Woodward, NB, Boyer, SE and Suppe, J (1989) Balanced Geological Cross-sections. Amer. Geophys. Union.