Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NGLC522	**Metamorphic Petrology**	3	0	0	3

Course Objective

The primary objective of the course is to introduce fundamental understanding of process, reaction, mineral assemblage formed in different protoliths during metamorphism. Constructing and being able to understand different graphical representation used in metamorphic petrology. Relation between tectonics and metamorphism.

Learning Outcomes

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

- Process and control of physico-chemical and compositional control on metamorphism of rocks.
- Application of thermodynamics on stability of minerals during metamorphism.
- Evaluating P-T-t path from textural relation and geothermobarometry.
- Relating tectonic setting with metamorphism.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Basics of metamorphism**: Definition, agent of metamorphism, types of metamorphism.	3	Agent and types of metamorphism
2	**Structure and texture of metamorphism:** Processes involved during metamorphic texture formation, Texture formed during different types of metamorphism,	5	Structural and textural features of metamorphic rocks
3	**Rock Nomenclature**: Classification of metamorphic rocks depending on texture and composition	3	Classification principles of igneous rocks
4	**Thermodynamics:** Definition of thermodynamic parameters, phase rule, First, second and third law, Gibb's free energy, chemical potential, activity, Equilibrium Constant, Geothermobarometry	6	Fundamental concepts of thermodynamics and geothermobarometry
5	**P-T-t path:** different types of P-T-t path, derivation of P-T-t information using textural relation and geothermobarometry.	2	Principle behind P-T-t path derivation and their interpretation
6	**Stable mineral assemblage in metamorphic rocks**: close system and open system, application of phase rule in such systems.	3	Close vs open system in metamorphic rocks and application of phase rule
7	**Chemographic projections:** ACF, AFM, AKFM, CMS diagram, Compatible diagram, Schrienmaker's rule petrogenetic grid and pseudo section	3	Different types of chemigraphic projection for representation of metamorphic assemblages
8	**Metamorphic reactions:** Different types of reaction in metamorphism and the process	3	Different types of metamorphic reactions
9	**Metamorphism of rocks with different protoliths:**pelitic, mafic, ultramafic and calcareous rock metamorphism, development of characteristic mineral assemblage during metamorphism depending on protolith.	9	Metamorphic rocks of different protolith
10	**Metasomatism**: metamorphic fluids, mass transport and minerals developed during metasomatism	3	What is metasomatism
11	**Relationship with tectonics:** Description of typical metamorphic assemblage/facies in relation to different tectonic setup	2	Link between metamorphism and tectonics
	Total Classes	42	

Text Books:

1. Principles of Igneous and Metamorphic Petrology by John D. Winter., 2009, by Prentice Hall.
2. Igneous and Metamorphic Petrology, Myron G. Best, 2002, by Wiley, John & Sons

Reference Books:

1. Metamorphic Petrology, by Francis J. Turner, 1980, by Taylor & Francis Inc