

DISCIPLINE SPECIFIC CORE COURSE– 9 (DSC-9): Metamorphic Geology

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Metamorphic Geology (DSC-9)	4	3	0	1	Class 12 th with Science	Studied Earth System Science, Structural Geology, and Mineralogy (or equivalent)

Learning Objectives

This course focuses on teaching about mineralogical and textural transformations in solid state. The main aim is to learn estimating natural state variables at the time of transformation as well as inferring the geodynamic settings of such changes.

Learning outcomes

This course will enable students to identify the mineral assemblages in hand specimen and through microscopic studies utilizing the concept of textural equilibrium, teach them to consider the rocks as chemical systems and apply the principle of phase rule as the major tool for the study of metamorphic rocks. Students will specially learn to infer orogenic processes through metamorphic assemblages and textures.

SYLLABUS OF DSC-9

UNIT – I (9 hours)

Detailed contents

Metamorphism: Definition of metamorphism. Factors controlling metamorphism, Types of metamorphism. Structure and textures of metamorphic rocks, Relationship between metamorphism and deformation

UNIT – II (12 hours)

Detailed contents

Phase rule and Goldschmidt mineralogical phase rule. Chemographic projections, concept of compatible and incompatible assemblages, bulk composition influence on metamorphic assemblages.

UNIT – III (12 hours)

Detailed contents

Metamorphic zones, index minerals and isograds. Continuous and discontinuous reactions, basics of geothermobarometry.

UNIT – IV (12 hours)

Detailed contents

Metamorphism of various protoliths, metamorphic rock associations-schists, gneisses, charnockites and eclogites. Melting and migmatites. Tectonic setting of metamorphic rocks, paired metamorphic belts, concept of P-T-t path.

Practical Component- (30 Hours)

Hand specimen study of metamorphic rocks.

Textural and mineralogical study of metamorphic rocks in thin sections.

Inferring mineral growth versus deformation in metamorphic rocks

Graphical plots of metamorphic mineral assemblages using chemographic projections.

Application of mineral formula calculations in metamorphic rocks

Essential/recommended readings

Winter, J. D. (2014). Principles of igneous and metamorphic petrology, Pearson.

Yardley, Bruce, and Clare Warren. (2021). An introduction to metamorphic petrology. Cambridge University Press.

Suggestive readings

Winter, J. D. (2014). Principles of igneous and metamorphic petrology, Pearson.

Yardley, Bruce, and Clare Warren. (2021). An introduction to metamorphic petrology. Cambridge University Press.

Philpotts, A. R., and Ague, J. J. (2022). Principles of igneous and metamorphic petrology. Cambridge University Press.

Metamorphic Phase Equilibria And Pressure-Temperature-Time-Paths

Frank S. Spear (reprinted 1995)

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.