DEPARTMENT OF GEOLOGY
BSc (H) Geology

Category I

Geology Courses offered for UG Programme of study with Geology as single core discipline

(B.Sc. Honours in Geology in three years)

DISCIPLINE SPECIFIC CORE COURSE -7 (DSC-7) – : Palaeontology

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		
Palaeontology (DSC-7)	4	3	0	1	Class 12th with Science	Studied Stratigraphy, Sedimentology, and Earth System Science (or equivalent)

Learning Objectives

To learn about the life forms of the geological past. To understand the diversity and evolution of past life. To know the evolutionary transitions and functional adaptations in different groups of animals and plants.

Learning outcomes

On successful completion of the course, the student will be able to: Appreciate how fossils get preserved in rocks, the nature of fossil record and how fossils are named in a taxonomic framework. Get to know different invertebrate fossil groups, their palaeobiology, and how they can be used in relative dating of rocks. Learn how vertebrates originated and their evolution through time. Understand important floral changes over time and the flora of the Indian coal-bearing sedimentary basins. Analyse the indirect evidences preserved in the rocks for the past existence of life. Critically analyse the role of fossils in relative dating of rocks, in interpreting past environments, past distribution of land and sea, and changes in ecosystems over time.

SYLLABUS OF DSC-7

UNIT – I (9 hours)

Detailed content

Fossilization processes and modes of preservation; nature and importance of fossil record

UNIT – II (9 hours)

Detailed contents

Brief introduction to important invertebrate groups (Bivalvia, Gastropoda, Brachiopoda, Graptolites, Trilobites) and their biostratigraphic significance. Significance of ammonites in Mesozoic biostratigraphy and their palaeobiogeographic implications. Functional adaptation in trilobites and ammonoids.

UNIT – III (9 hours)

Detailed contents

Vertebrates: Origin of vertebrates and major steps in vertebrate evolution; Vertebrate evolution in the Palaeozoic Era; Mesozoic reptiles with special reference to origin diversity and extinction of dinosaurs

UNIT – IV (9 hours))

Detailed contents

Introduction to Palaeobotany; fossil record of plants through time; Gondwana Flora.

UNIT – V (9 hours)

Detailed contents

Introduction to Ichnology; Application of fossils in Stratigraphy, Fossils and paleobiogeography; Fossils as a window to the evolution of ecosystems.

Practical Component- (30 Hours)

Study of fossils showing various modes of preservation. Study of diagnostic morphological characters, systematic position, stratigraphic position and age of various invertebrate, vertebrate and plant fossils.

Essential/recommended readings

Raup, D. M. & Stanley, S.M. (1985). Principles of Paleontology, W.H.Freeman & Company
Clarkson, E. N.K. (2012) Invertebrate Paleontology and evolution 4th Edition by Blackwell

Suggestive readings

Raup, D. M. & Stanley, S.M. (1985). Principles of Paleontology, W.H.Freeman & Company
Clarkson, E. N.K. (2012) Invertebrate Paleontology and evolution 4th Edition by Blackwell.
Foote, M. & Miller, A. I. (2006). Principles of Paleontology, third edition.
Benton, M. (2014). Vertebrate Palaeontology, fourth edition.
Jones, R.W. (2011). Applications of Palaeontology - Techniques and Case Studies

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

DISCIPLINE SPECIFIC CORE COURSE – 8 (DSC-8): Sedimentary Geology

Credit distribution, Eligibility and Prerequisites 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		
Sedimentary Geology (DSC-8)	4	3	0	1	Class 12th with Science	Studied Stratigraphy, Earth System Science (or equivalent)

Learning Objectives

Main objective of the course is to provide basic and advance knowledge to students about sediments origin, transport, and depositions and formation of the sedimentary rocks and their distribution in space and time.

Learning outcomes

Students will learn and appreciate the concepts of weathering and sedimentary flux, the basic concepts of sediment transport and formation of sedimentary structures. Grain size scales and analysis. Students will be able to appreciate sedimentary facies, classification of sedimentary rocks, sedimentary environments and provenance.

SYLLABUS OF DSC- 8

UNIT – I (9 hours)

Detailed contents

Introduction to Sedimentary Geology. Chemistry of weathering processes. Sediments: origin, transportation, deposition, consolidation and diagenesis

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UNIT – II (9 hours)

Detailed contents

Sediment granulometry: Grain size scales Udden-Wentworth and Krumbein (phi) scale, particle size distribution; mean, median, mode, standard deviation, skewness. Environmental connotation.

UNIT – III (9 hours)

Detailed contents

Sedimentary fabric, textures, Porosity and permeability. Sedimentary structures: Syn-sedimentary, Penecontemporaneous

UNIT – IV (9 hours)

Detailed contents

Ichnofossils: Sediment-organism interaction. classification of sedimentary rocks. Tectonics and Climate Diagenesis of terrigenous and chemical sediments

UNIT – V (9 hours)

Detailed contents

Concept of sedimentary facies, paleoenvironment and paleocurrent analyses. Introduction to sedimentary environment: aeolian, glacial, fluvial, near-shore and deep-marine environments. Introduction to carbonate rocks: classification

Practical Component- (30 Hours)

Study of megascopic characters of major sedimentary rocks:
Sketching of primary sedimentary structures in laboratory and museum specimen: ripple marks, cross beddings, sole marks, biogenic structures.
Microscopic study of textures and diagenetic features in sedimentary rocks:

Essential/recommended readings

Prothero, D.R., and Schwab, F. 2003. Sedimentary Geology. Freeman & Co.
Boggs Sam Jr. 1995. Principles of Sedimentology and Stratigraphy, Prentice Hall

Suggestive readings (if any)

Prothero, D.R., and Schwab, F. 2003. Sedimentary Geology. Freeman &Co.
Boggs Sam Jr. 1995. Principles of Sedimentology and Stratigraphy, Prentice Hall.
Stanley, S. M. 1985. Earth and Life through time. Freeman & Co.
Tucker, M., 1988 Techniques in sedimentology Blackwell scientific publications
Nicols, G., 2009 Sedimentology and Stratigraphy Wiley-Blackwell

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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 12th 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

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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 Presure-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.