Semester Lecture Plan

Name of the college: Government College of Arts, Science & Commerce, Sanquelim, Goa-India

Name of Faculty: Ms. Magnolia Aurea Miranda	**Subject:** Geology	
Paper code: GEO 305	**Program/Course: TY B.Sc.**	**Division:**
Academic year: 2025 - 2026	**Semester: VI**	**Total Lectures: 41**

Course Objectives:

1. Describe the agents and factors of metamorphism. CL2
2. Classify metamorphic rocks using various schemes. CL2
3. Explain the mineral compatibility diagrams and their utility. CL2

Course Learning Outcome:

At the end of the course the student will be able to:

1. Distinguish metamorphic rocks from other types of rocks. CL2
2. Categorise and relate the metamorphic mineral assemblages according to their modes of formation. CL3
3. Interpret the deformation mechanism based on fabric. CL3
4. Identify tectonic settings based on the type of metamorphic rock. CL3

Month	Lectures From:	To:	No. of lectures allotted	Topic, Subtopic to be covered	Exercise / Assignment	ICT Tools	Reference books
December	1/12/25	6/12/25	2	Definition of metamorphism.		Projector	1,2
	8/12/25	13/12/25	3	Upper and lower limits of metamorphism		Projector	1,2

	15/12/25	20/12/25	0	Tarang			
	22/12/25	23/12/25	2	Migmatites: components, classification into metatexite and ditexite,		Projector	1,2
January	2/1/26	3/1/26	0				
	5/1/26	10/1/26	3	Structures: dilation, stromatic, net, agmatite, Schlieren, schollen, nebulitic, raft-like, vein. Factors responsible for metamorphism		Projector	1,2
	12/01/26	17/1/26	3	Heat (radioactive, magmatic, tectonic heat), geothermal gradient (in different crustal regions); pressure (P) (directed and load pressure);	Exercise on deviatoric stress	Projector	1,2
	19/1/26	24/1/26	3	Composition of the parent rock- Protolith (X); fluids (H2O and CO2) (Xf); Role of time in metamorphism.		Projector	1,2,3

	26/1/26	31/1/26	2	Classifying the following types of metamorphism based on areal extent (local and regional): Contact metamorphism, Orogenic Metamorphism, Burial Metamorphism, Ocean Floor Metamorphism, fault zone metamorphism, Impact or shock metamorphism.		Projector	1,2,3
February	2/2/26	7/2/26	3	Classification of metamorphic rocks: Based on fabric (Foliated and non-foliated) and based on mineralogy.		Projector	1,2,3
	9/2/26	14/2/26	3	Fabric: Definition, types- relict (primary features such bedding, fossil outlines, grain boundaries), Imposed: isotropic fabric (granoblastic, diablastic/decussate), anisotropic fabric (slaty cleavage,		Projector	1,2,3

				schistosity, gneissic banding)			
	16/2/26	21/2/26	3	Anisotropic fabric (mylonitic fabric), Lineation (crenulation, mineral lineation). Porphyroblasts - definition and examples. Idioblastic series.		Projector/ Smart board	1,2,3
	23/2/26	28/2/26	3	Prograde and Retrograde metamorphism, Concept of index minerals, their significance in mapping and understanding tectonic history.		Projector/ Smart board	1,2,3
March	2/3/26	7/3/26	3	ACF and AFM (AKFM) diagrams their advantages and limitations. Facies concept after Goldschmidt and Eskola.		Projector/ Smart board/ Smart board	1,2,3
	16/3/26	21/03/26	3	Facies series : Contact Facies Series (very low-P), Buchan or Abukuma Facies Series (low-P regional)	Assignment	Projector/ Smart board	1,2,3

	23/03/26	28/03/26	3	Barrovian Facies Series (medium-P regional), Sanbagawa Facies Series (high-P, moderate-T), Franciscan Facies Series (high-P, low T)]	Assignment	Projector/ Smart board	1,2,3
	30/03/26	31/3/26	2	Metamorphism in relation to the plate tectonic environments. Paired metamorphic belts		Projector/ Smart board	1,2,3

References:

1.Raymond, Loren: Igneous and Metamorphic Petrology, John Wiley Sons
2. Winter John: Igneous and metamorphic petrology
3. Blatt and Tracy: Petrology

Practical Plan

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Name of Faculty: Magnolia Aurea Miranda	**Subject:** Geology	
Paper code: GEO 305	**Program: TY BSc**	**Division:**
Academic year: 2025 - 2026	**Semester: VI**	**Total Practicals/Labs: 14**
Credits: 1		

Course Objectives:

1. Describe the agents and factors of metamorphism. CL2
2. Classify metamorphic rocks using various schemes. CL2
3. Explain the mineral compatibility diagrams and their utility. CL2

Course Learning Outcome:

At the end of the course the student will be able to:
1. Distinguish metamorphic rocks from other types of rocks. CL2
2. Categorise and relate the metamorphic mineral assemblages according to their modes of formation. CL3
3. Interpret the deformation mechanism based on fabric. CL3
4. Identify tectonic settings based on the type of metamorphic rock. CL3

Student Learning Outcome:				
Month	**Practicals/ Labs Scheduled Date**	**No. of Practicals/Labs planned**	**List of Experiments**	**Reference books**
December	10-12-25	5	Megascopic identification of metamorphic rocks	Raymond, Loren: Igneous and Metamorphic Petrology, John Wiley Sons Winter John: Igneous and metamorphic petrology Blatt and Tracy: Petrology
	17-12-25			
	07-01-26			
	14-01-26			
	21-01-26			
January	28-01-26	5	Microscopic identification of metamorphic rocks in thin-sections.	
	04-02-26			
	11-02-26			
	18-02-26			
February	25-02-26			
	04-03-26	2	ACF diagrams	Metamorphic Petrology: Bhasker Rao Petrology: Blatt and Tracy Online Resources
	11-03-26			
March	18-03-26	2	AFM diagrams	
	25-03-26			

Assessment Rubrics

Component	Max Marks
ISA 1	7.5
ISA 2	7.5
Practical	25
Project	-
Semester End Exam	60