VIDYASAGAR UNIVERSITY

Midnapore, West Bengal



PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE WITH GEOLOGY (MULTIDISCIPLINARY STUDIES)

3-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes (CCFUP), 2023 & NEP, 2020

VIDYASAGAR UNIVERSITY BACHELOR OF SCIENCE IN PHYSICSL SCIENCES with GEOLOGY (Under CCFUP, 2023)

Level	YR.	SEM	Course	Course Code	Course Title	Credit	L-T-P	Marks		
			Type					CA	ESE	TOTAL
B.Sc. in Physical Sc. with Geology	2 nd	Ш	SEMESTER-III							
			Major-A2	GELPMJ02	T: Structural Geology; P: Practical	4	3-0-1	15	60	75
					(To be studied by students taken Geology as Discipline- A)					
			Major-A3	GELPMJ03	T: Petrology; P: Practical	4	3-0-1	15	60	75
					(To be studied by students taken Geology as Discipline- A)					
			SEC	SEC03	To be taken from SEC-03 of Discipline C.	3	0-0-3	10	40	50
			AEC	AEC03	Communicative English-2 (common for all programmes)	2	2-0-0	10	40	50
			MDC	MDC03	Multidisciplinary Course-3 (to be chosen from the list)	3	3-0-0	10	40	50
			Minor-3	GELMIN03	T: Introduction to Petrology; P: Practical	4	3-0-1	15	60	75
			(DiscC3)		(To be studied by students taken Geology as Discipline- C)					
					Semester-III Total	20				375
		SEMESTER-IV								
		IV	Major-B2		To be decided	4	3-0-1	15	60	75
					(Same as MajorA2 for Geology taken as Discipline-B)					
			Major-B3		To be decided	4	3-0-1	15	60	75
			3.6 .	CELMIE 01	(Same as Major–A3 for Geology taken as Discipline-B)	_	2.0.1	4.5		
			Major (Flactive) 1	GELMJE-01	Fuel Geology	4	3-0-1	15	60	75
			(Elective) -1		(To be studied by students taken Geology as Discipline- A)					
			AEC	AEC04	MIL-2 (common for all programmes)	2	2-0-0	10	40	50
			Minor -4	GELMIN04	T: Introduction to Mineralogy; P: Practical	4	3-0-1	15	60	75
			(DiscC4)		(To be studied by students taken Geology as Discipline- C)					
			Summer	IA	Internship / Apprenticeship- activities to be decided by the Colleges	4	0-0-4	-	-	50
			Intern.		following the guidelines to be given later					
					Semester-IV Total	22				400
					TOTAL of YEAR-2	42	-	-	-	775

MJP = Major Programme (Multidisciplinary), MI = Minor, A/B = Choice of Major Discipline; C= Choice of Minor Discipline; SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical, MIL = Modern Indian Language

VIDYASAGAR UNIVERSITY, PASCHIM MIDNAPORE, WEST BENGAL

MAJOR (MJ)

MJ A2/B2: Structural Geology Credits 04 (FM: 75)

MJ A2/B2T: Structural Geology Credits 03 [45L]

Course contents:

Unit-I: Basic structural elements

- 1. Diastrophic and non-diastrophic structures
- 2. Structural elements: planar and linear structures, concept of strike and dip, trend and plunge, rake/pitch
- 3. Application of primary sedimentary and igneous structure in structural geology. Unconformity and its types; recognition of Unconformity
- 4. Topographic map

Unit-II: Stress and strain in rocks

- 1. Concept of Stress. Normal and shear stress.
- 2. Concept of Strain: Homogeneous and inhomogeneous strain, Rotational and irrotational strain in rocks.
- 3. Strain ellipsoids of different types and their geological significance.
- 4. Concept of Rock deformation: Brittle and ductile deformation.

Unit-III: Folds

- 1. Fold morphology
- 2. Geometric and genetic classification of folds
- 3. Introduction to the mechanics of folding: Buckling, Bending, Flexural slip and flow folding

Unit IV: Foliation and lineation

- 1. Description and origin of foliations: axial plane cleavage and its tectonic significance
- 2. Description and origin of lineation and relationship with the major structures

Unit V: Fractures and faults

- 1. Geometric and genetic classification of fractures and joints.
- 2. Geologic/geomorphic criteria for recognition of faults.

MJ A2/B2P: Structural Geology Credits 01

List of Practical

- 1. Basic idea of topographic maps, Topographic sheets of various scales
- 2. Interpretation of topographic maps
- 3. Interpretation of Geological maps with unconformity, fault, fold and igneous bodies. Construction of structural cross section
- 4. Stereographic projections of planes and lines

Suggested Readings:

- 1. Davis, G. R. (1984) Structural Geology of Rocks and Region.
- 2. John Wiley Billings, M.P. (1987) Structural Geology, 4th edition, Prentice-Hall.
- 3. Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.
- 4. Pollard, D. D. (2005) Fundamental of Structural Geology. Cambridge University Press.
- 5. Ragan, D. M. (2009) Structural Geology: an introduction to geometrical techniques (4th Ed).
- 6. Cambridge University Press (For Practical) Lahee F. H. (1962) Field Geology. McGraw Hill

MJ A3/B3: Petrology Credits 04 (FM: 75)

MJ A3/B3T: Petrology(Theory) Credits 03 [45L]

Course contents:

Unit-I: Introduction to petrology

- 1. Define Rock cycles;
- 2. Introduction of Petrology; Definition of Rocks; Major sub-divisions of Petrology;

Unit-II: Igneous petrology

Definition, composition and origin of magma and lava; Bowen's reaction series; Classification of igneous rocks; Magmatic differentiation; Petrography of granite, syenite, peridotite, anorthosite, gabbro, dolerite and basalt. Texture of igneous - Granitic texture, Porphyritic texture, Graphic texture and Glassy texture

Unit III: Sedimentary Petrology

Formation of sedimentary rocks; Erosion, transportation, Deposition, Consolidation and Cementation of sediments; Classification of sedimentary rocks, Sedimentary structures – Bedding and lamination, Current Bedding, Graded Bedding, Stratification, Lamination, Ripple Marks, Rain Prints, Mud cracks. Petrography of conglomerate, breccia, sandstone, shale and limestone

Unit IV: Metamorphic petrology

Definition of metamorphism; Agents and Types of Metamorphism; Types of metamorphism – Thermal or Contact metamorphism, Cataclastic metamorphism, Dynamothermal metamorphism, Plutonic metamorphism; Petrography of schist, gneiss, marble, charnockite and khondalite.

MJ A3/B3P: Petrology (Practical) Credits 01

List of Practical

1. Megascopic and microscopic identification of igneous, sedimentary and metamorphic rocks as mentioned in theory section.

Suggested Readings:

- 1. Sedimetantary Petrology (IIIrd edition) F. J. Pettijohn
- 2. Igneous petrology Mihir K Bose
- 3. Metamorphic petrology C B Rao
- 4. Bangar, K.M., 2001. Principles of Engineering Geology.
- 5. Dasgupta A. (2013). World Press: Introduction to Earth Science
- 6. Mahapatra G. B. (2019): A Textbook of Geology

Major Elective (MJE)-01: Fuel Geology Credits 04 (FM: 75)

Major Elective (MJE)-01 T: Fuel Geology (Theory)

Credits 03 [45L]

Course contents:

Unit-I: Energy Resources

1. Different Sources of energy: Global and Indian scenario

Unit-II: Coal

- 1. Definition and origin of Coal
- 2. Basic classification of coal.
- 3. Fundamentals of Coal Petrology Introduction to lithotypes, microlithotypes and macerals in coal
- 4. Proximate and Ultimate analyses
- 5. Major coal basins of India

Unit-III: Coal as a fuel

- 1. Concept of clean coal technology
- 2. Coal Bed Methane (CBM): global and Indian scenario
- 3. Underground coal gasification
- 4. Liquefaction of coal

Unit-IV: Petroleum

- 1. Chemical composition and physical properties of crudes oil
- 2. Origin and migration of petroleum
- 3. Kerogen: Maturation of kerogen; Biogenic and Thermal effect

Unit-V: Petroleum Reservoirs and Traps

- 1. Reservoir rocks: general attributes and petrophysical properties.
- 2. Cap Rocks: definition and general properties
- 3. Hydrocarbon traps: definition, Classification of hydrocarbon traps structural, stratigraphic and combination
 - a. Time of trap formation and time of hydrocarbon accumulation.
 - b. Petroliferous basins of India

Major Elective (MJE)-01 P: Introduction to Fuel Geology- Lab

Credits 01

List of Practical

- 1. Study of hand specimens of coal
- 2. Reserve estimation of coal
- 3. Plot of major coal basins in the map of India
- 4. Plot of major petroliferrous basins in the map of India

Suggested Readings:

- 1. Chandra D. (2007). Chandra's Textbook on applied coal petrology. Jijnasa Publishing House.
- 2. Shelly R. C. (2014). Elements of Petroleum geology: Third Edition, Academic Press
- 3. Bjorlykke, K. (1989). Sedimentology and petroleum geology. Springer-Verlag.
- 4. Bastia, R., & Radhakrishna, M. (2012). Basin evolution and petroleum prospectively of the continental margins of India (Vol. 59). Newness.

MINOR (MI)

(To be studied by students taken Geology as Discipline- C)

MI-3/C3: Same as Minor-3 (GELMIN03) of Geology (Hons) programme Credits 04

Full Marks: 75

MI-4/C4: Same as Minor-4 (GELMIN04) of Geology (Hons) programme Credits 04

Full Marks: 75

SKILL ENHANCEMENT COURSE (SEC)

(To be studied by students taken Geology as Discipline- C)

SEC-03 P: Same as SEC-03 (GELSEC03) of Geology (Hons) programme Credits 03

Full Marks: 50