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 Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
B.Sc. in Physical Sc. with Geology	2nd	III	**SEMESTER-III**							
			Major-A2	GELPMJ02	**T: Structural Geology; P: Practical** *(To be studied by students taken* **Geology** *as Discipline- A)*	4	3-0-1	15	60	75
			Major-A3	GELPMJ03	**T: Petrology; P: Practical** *(To be studied by students taken* **Geology** *as Discipline- A)*	4	3-0-1	15	60	75
			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 (Disc.-C3)	GELMIN03	**T: Introduction to Petrology; P: Practical** *(To be studied by students taken Geology as Discipline- C)*	4	3-0-1	15	60	75
					Semester-III Total	20				375
		IV	**SEMESTER-IV**							
			Major-B2		*To be decided (Same as MajorA2 for Geology taken as Discipline-B)*	4	3-0-1	15	60	75
			Major-B3		*To be decided (Same as Major–A3 for* **Geology** *taken as Discipline-B)*	4	3-0-1	15	60	75
			Major (Elective) -1	GELMJE-01	**Fuel Geology** *(To be studied by students taken Geology as Discipline- A)*	4	3-0-1	15	60	75
			AEC	AEC04	MIL-2 (***common for all programmes***)	2	2-0-0	10	40	50
			Minor -4 (Disc.-C4)	GELMIN04	**T: Introduction to Mineralogy; P: Practical** *(To be studied by students taken Geology as Discipline- C)*	4	3-0-1	15	60	75
			Summer Intern.	IA	Internship / Apprenticeship- **activities to be decided by the Colleges following the guidelines to be given later**	4	0-0-4	-	-	50
					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

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