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DEPARTMENT OF GEOLOGY

NAME OF FACULTY: ABHIK KUNDU

TEACHING PLAN FOR SEMESTER 1

NAME OF FACULTY: Abhik Kundu

PAPER: GEL-A-CC-1-1-TH EARTH SYSTEM SCIENCE
GEL-A-CC-1-2-TH (MINERAL SCIENCE) Unit 1 CRYSTALLOGRAPHY
GEL-A-CC-1-2-P (MINERAL SCIENCE) (Topic 1)

LECTURES ALLOTED: 4 [GEL-A-CC-1-1-TH Earth System Science]
20 [GEL-A-CC-1-2-TH (Mineral Science) Unit 1 Crystallography]
15 [GEL-A-CC-1-2-P (Mineral Science)]

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: Unit 5: Plate Tectonics in GEL-A-CC-1-1-TH EARTH SYSTEM SCIENCE	
1	Historical development of the concept of continental drift and plate tectonics.
2-3	Plates and plate boundaries.
4-5	Geodynamic elements of Earth: mid oceanic ridges, trenches, transform faults and island arcs.
6-7	Plate tectonics: mountain belts and rift valleys.
TOPIC/SUBTOPIC: Crystallography Theory in **GEL-A-CC-1-2-TH (Mineral Science)**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1	Concept of crystal and crystalline matter. Internal order in crystal.
2-6	Crystal structure; elementary ideas about crystal morphology in relation to internal structures
7-10	Crystal parameters and indices; form and zone.
11-20	Stereographic projection of crystal faces, Crystal symmetry, classification of crystals into systems. Lattice theory and 32 point groups. International symbol of point groups.
TOPIC/SUBTOPIC: Crystallography Practical in **GEL-A-CC-1-2-P (Mineral Science)**	
1-5	Study of the symmetry of crystals.
6-15	Stereographic projection of crystals

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TEACHING PLAN FOR SEMESTER 2

NAME OF FACULTY : Abhik Kundu

PAPER : **Paper –GEL-A-CC-2-4-TH STRUCTURAL GEOLOGY**
LECTURES ALLOTED: 25

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	**GEL-A-CC-2-4-TH STRUCTURAL GEOLOGY**
1-3	**Unit 1: Basic Structural Elements** Diastrophic and non-diastrophic structures. Structural elements: planar and linear structures, concept of strike and dip, trend and plunge, rake/pitch.
3-4	Application of primary sedimentary and igneous structure in structural geology. Unconformity and its types, recognition of unconformity.
5-6	Concept of scale of observation of structures. Topographic maps. Outcrop patterns of different structures.
7-9	**Unit 2: Stress and Strain in Rocks** Basic concept of rock deformation. Concept of Stress.
10-16	Concept of strain: Homogeneous and inhomogeneous strain Rotational and irrotational strain in rocks. Strain ellipsoids of different types and their geological significance. Flinn and Ramsay's diagram. Concept of brittle and ductile deformation.
17-22	**Unit 3: Folds** Fold morphology; Geometric classification of folds; elementary idea on mechanism of folding-buckling, bending, flexural slip and flow folding. Relation of foliation and lineation with folds
23-25	**Unit 4: Foliation and Lineation** Morphological features of foliations and lineations. Tectonic significance of foliation and lineation. Brief idea of origin of foliation.

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TEACHING PLAN FOR SEMESTER 4

NAME OF FACULTY : Abhik Kundu

PAPER : **Paper –** GEL-A-SEC-B-4- 1-P Field Work
LECTURES ALLOTED: 7 days

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	GEL-A-SEC-B-4- 1-P Field Work
7 Days	• Map reading and geological mapping • stratigraphic and biogeographic correlation using fossils • Preparation of a geological map of a small area with homoclinal or gently folded beds. • Stereographic plots of orientation data and their interpretation. • Report writing.

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TEACHING PLAN FOR SEMESTER 5

NAME OF FACULTY : Abhik Kundu

PAPER : **Paper – GEL-A-DSE-A-5-1-TH TECTONICS**
GEL-A-DSE-A-5-1-P TECTONICS

LECTURES ALLOTED: 30 **[GEL-A-DSE-A-5-1-TH]**

6 **[GEL-A-DSE-A-5-1-P]**

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **GEL-A-DSE-A-5-1-TH TECTONICS**	
1-3 4 5-7 8-10 12	**Unit 1: Introduction** ● Continents and oceans. Continental and oceanic crust. Internal processes of earth. Ophiolites. ● Palaeomagnetism. ● Concept of lithosphere and asthenosphere. Physical character of lithosphere and asthenosphere. ● Concept of plate. Plate tectonic system. ● Concept of hot spot and plumes
12-16	**Unit 2: Historical Perspective: Continental Drift, Sea Floor Spreading and Plate Tectonics** Wegener's Continental drift hypothesis and its evidences. Continental position in the past. Sea-floor spreading theory and its evidences. Magnetic time scale. Palaeomagnetism and motion of plates.
17-18 19-22 23 24-26	**Unit 3: Plate and Plate boundaries** ● Plates: physical character of plates. Macro and micro plates. ● Plate boundaries: types, character, Identification of boundaries. Motion along plate boundaries. Triple points. ● Kinematics of plate motion. Rate of plate motion. ● Volcanic arcs, island arcs, trenches, accretionary prisms, oceanic ridges, transform faults. Magmatism in oceanic ridges and in subduction zones.
27-28 29-30 11	**Unit 4: Plate Tectonics: Past and Present** ● Plate tectonics model and its evidences. Distribution of plates in the Earth. Reconstruction of plates - supercontinent. ● Supercontinents and their breakup and assembly. Assembly and breakup of Pangaea. Wilson cycle. ● Driving mechanisms of plates. Plate tectonics and mantle convection.
TOPIC/SUBTOPIC: **GEL-A-DSE-A-5-1-P TECTONICS**	
1-6	Geometry of plate tectonics: Vector solutions in 2D and 3D of plate movements Problems of plate movements - Rotations on sphere.

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TEACHING PLAN FOR MSc in Applied Geology

TEACHING PLAN FOR SEMESTER 1 (M.Sc. Applied Geology)

NAME OF FACULTY : Abhik Kundu

PAPER : Geol CT 11: Structural Geology & Geol CP 11: Structural Geology
Geol CP13: Field Geology

LECTURES ALLOTED: Geol CT 11 -17, Geol CP 11 – 12, Geol CP13 – At least 7 days

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **Geol CT11: Structural Geology**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-3	Mechanism of folding and superposed folding;
4-6	Interpretations of ductile structures: foliation, lineation, boudinage;
7-9	Structural analysis of deformed terrain.
10-12	Grain scale deformation: Mechanism and its manifestation in rock microstructure.
13-15	Shear Zones, Grain scale deformation mechanism and its manifestation in microstructure:
15-17	Solid State Diffusion Creep. Granular flow and Superplasticity.
TOPIC/SUBTOPIC: **Geol CP11: Structural Geology**	
1-5	Rotational techniques and solving problems;
6-8	Orientation of planes from drill hole data;
9-12	Structural analysis: cylindrical folds, superposed folds.
TOPIC/SUBTOPIC: **Geol CP13: Field Geology**	
At least 7 days	Field training to students in different geological terranes including mine-visits.

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TEACHING PLAN FOR SEMESTER 3 (M.Sc. Applied Geology)

NAME OF FACULTY : Abhik Kundu

PAPER : Geol CP 33: Geomathematics and Geostatistics

LECTURES ALLOTED: 30

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **Geol CT33: Structural Geology**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
30 Lectures	Scientific methods & some basic concept of statistics: Sample- Universe: Measurement- scale & error; Models; Measurement of variability; Probability Population distribution- binomial, normal, Poisson. Statistical inferences- errors in judgment Confidence Intervals. Small sampling theory- Chi-square, Student's t, Snedecor's F tests Non –parametric tests- Kolmogorov-Smirnov. ANOVA-correlation & linear regression

Abhik Kundu

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TEACHING PLAN FOR SEMESTER 3 (M.Sc. Applied Geology)

NAME OF FACULTY: Abhik Kundu

PAPER: Geol CP43: Earth Science Colloquium
Geol C45: Thesis (written and viva)

LECTURES ALLOTED: Geol CP43 – 5 Geol C45 - 60

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **Geol CP43: Earth Science Colloquium**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
5 Lectures (Tentatively)	Compulsory seminar presentation by students on geologically important themes based on published papers.
TOPIC/SUBTOPIC: **Geol CP45: Thesis (written and viva)**	
60 hours (Tentatively) often with field work	Thesis

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NAME OF FACULTY :ASHIS KUMAR DAS

SEMESTER:1

NAME OF FACULTY : ASHIS KUMAR DAS

DEPARTMENT:GEOLOGY

PAPER : GEL-A-CC-1-2-TH(MINERAL SC.), UNIT-2

PAPER CODE: GEL-A-CC-1-2-TH

LECTURES ALLOTED IN SYLLABUS:

LEC. NO.	TOPIC/SUBTOPIC : UNIT3-ROCK FORMING MINERALS IN GEL-A-CC-1-2-TH MINERAL SCIENCE
1-2	Rock forming minerals: minerals definition and formation mechanisms.
3-8	Physical and Chemical properties of minerals
9-10	Chemical classification of minerals
11-12	Polymorphism in minerals

PAPER : GEL-A-CC-1-1-P EARTH SYSTEM SCIENCE

PAPER CODE: GEL-A-CC-1-1-P

LEC. NO.	TOPIC/SUBTOPIC :
1-12	Study of minerals in hand specimens(Silicates: Olivine,Garnet, Andalusite,Sillimanite, Kyanite, Staurolite, Beryl, Nepheline, Tourmaline,Pyroxene, Tremolite, Hornblende, Actinolite, Talc, Muscovite, Biotite, Quartz, Feldspar, Zeolite, Asbestos,Psolomelane, Pyrolusite,Corundum, Pyrite, Chalcopyrite, Ilmenite, Chromite, Fluorite, Apatite, Calcite, Aragonite, Dolomite, Graphite.

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SEMESTER:3

NAME OF FACULTY :ASHIS KUMAR DAS

DEPARTMENT:GEOLOGY

PAPER : GEL-A-CC-3-7-TH PALAEONTOLOGY and GEL-A-CC-3-7-P. PALAEONTOLOGY

LECTURES ALLOTED IN SYLLABUS: Unit-1 to Unit-6(TH) and All Practicals.

LEC. NO.	TOPIC/SUBTOPIC : PALAEONTOLOGY-TH,GEL-A-CC-3-7.
1-6	Unit-1: Fossilization and fossil record,Nature and importance of fossil record; Fossilization processes and modes of preservation
7-12	Unit-2; Taxonomy and species concept;Species concept with special reference to palaeontology;Taxonomic hierarchy Theory of organic evolution interpreted from fossil record.
13-20	Unit-3: Invertebrates: Brief introduction important invertebrate groups(Mollusca, and Brachiopoda) and their biostratigraphic significance. Significance of ammonites in Mesozoic biostratigraphy and their palaeobiogeographic implications Functional adaptation in Trilobites and ammonoids. Origin of invertebrates and major steps in their evolution
21-30	Unit-4: Vertebrates Origin of Vertebrates and major steps in Vertebrate evolution. Mesozoic reptiles with special reference to origin, diversity and extinction of dinosaurs. Evolution of horse and intercontinental migrations. Human evolution.
31-34	Unit-5: Introduction to Palaeobotany, Gondwana Flora. Introduction to Ichnology.

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35-44	Unit-6: Application of fossils in stratigraphy, Biozones, Index fossils, correlation. Role of fossils in sequence stratigraphy; Fossils and palaeo-environmental analysis. Fossils and palaeobiogeography, biogeographic provinces, Dispersal and barriers. Palaeoecology- fossils as a window to the evolution of ecosystems.

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PAPER: GEL-A-CC-3-7P PALAEONTOLOGY PRACTICAL

LEC. NO.	TOPIC/SUBTOPIC : PAPER-GEL-A-CC-3-7P, PALAEONTOLOGY PRACTICAL
1-6	Study of fossils showing various modes of preservations.
7-26	Study of morphological characters of various invertebrates,vertebrates and plant fossils.
27-30	Elementary exercise on functional morphology of bivalves.

PAPER: SEC-A-3-1-P FIELD WORK

Lec No	SUBTOPIC : PAPER – GEL-A-SEC-A-3-1-P FIELD WORK
	Topographic sheet: methods of naming. Features, scale. Map reading. Use of topographic sheets in field. Marking location in topographic sheet using physical features and bearing. Identification of rock types in field. Identification of primary and secondary structures in field. Clinometer and Brunton compass: use of the instruments in measuring geological data in field. Techniques of measurement of orientation data in field. Litholog measurement Recording field data in maps and notebooks. Report writing.

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SEMESTER:5

PAPER : GEL-A-CC-5-12-TH ENGINEERING GEOLOGY

PAPER CODE: GEL-A-CC-5-12-TH

LECTURES ALLOTED IN SYLLABUS: Unit-1 to Unit-3

LEC. NO.	TOPIC/SUBTOPIC : UNIT3-ROCK FORMING MINERALS IN GEL-A-CC-1-2-TH MINERAL SCIENCE
1-2	Unit-1: Roles of engineering geologists in planning, design and construction of major man-made structural features.
3-8	Unit-2: Site investigation and characterization.
9-11	Unit-3: Foundation
12-14	Foundation treatment; Grouting, Rock-Bolting and other support mechanisms.

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SEMESTER:6

PAPER : GEL-A-DSE-A-6-1-TH EARTH AND CLIMATE

PAPER CODE: DSE-A-6-1

LECTURES ALLOTED IN SYLLABUS:Unit-1 to Unit-6

LEC. NO.	TOPIC(S) TAUGHT
1-4	Unit-1: Climate system: Forcing and responses Components of the climate system, climate forcing, climate controlling factors. Feedbacks in climate system(positive and negative)
5-8	Unit-2 Heat budget of Earth Incoming solar radiation, receipt and storage of heat transformation. Earth's heat budget, interaction amongst various sources of earth's heat.
9-14	Unit-3: Atmosphere-Hydrosphere Layering of atmosphere and atmospheric circulation; atmosphere and ocean interaction and its effects on climate; Surface and deep circulation. Sea ice and glacial ice.
15-18	Unit-4: Response of biosphere to earth's climate Climate change: natural vs anthropogenic effects; Future perspectives. Brief introduction to archives of climate change; brief introduction to palaeoclimate; Palaeoclimate data from India.
19-22	Unit-5: Orbital cyclicity and climate Milankovitch cycles and variability in the climate. Glacial and interglacial stages; the last glacial maximum. Pleistocene glacial-interglacial cycles.

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23-25	Unit-6:Monsoon; Mechanism of monsoon; Monsoonal variation through time. Factors associated with monsoonal intensity. Effect of monsoon.

PAPER : GEL-A-DSE-B-6-1-TH FIELD GEOLOGY AND GRAND VIVA

PAPER CODE: DSE-B-6-1

LECTURES ALLOTED IN SYLLABUS:Unit-1

LEC. NO.	TOPIC(S) TAUGHT
	Viva-voce on all topics covered under six semester course curricula.

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PAPER : GEL-A-DSE-B-6-1-P FIELD GEOLOGY AND GRAND VIVA

PAPER CODE: DSE-B-6-1

LECTURES ALLOTED IN SYLLABUS:

LEC. NO.	TOPIC(S) TAUGHT
7-day fieldwork	Preparation of a geological map of a small area with folded/faulted beds. Interrelation between different structural elements and their interrelationships. Visit to one underground/open cast mine: mining operation, surface geological expression of mining site, visit to dam site.
	Report writing

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TEACHING PLAN of APPLIED GEOLOGY Msc FOR SEMESTER-1

NAME OF FACULTY : ASHIS KUMAR DAS

PAPER :GEOL CT 13: MINERALOGY

LECTURES ALLOTED: 10

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: GEOL CT 13: MINERALOGY	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-6	Feldspar Group: Internal structure,Alkali-Feldspar, Plagioclase Feldspar and ternary feldspar, proportion of Al-occupancy in T sites in K-feldspar; degree of ordering, 2V as an indicator of ordering in K-feldspar, polymorphism of NaAlSi3O8 ordering paths in albite, structural states of plagioclase, obliquity of K-feldspar.
7-10	Nepheline: Constitution of Nepheline, compositional non-stoichiometry, nephelines of volcanic and plutonic/metamorphic origin, nature of Al-Si ordering, vacant site from chemical analysis of nepheline.

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TEACHING PLAN FOR SEMESTER-2

NAME OF FACULTY : ASHIS KUMAR DAS

PAPER : GEOL CT 21: PALAEONTOLOGY

LECTURES ALLOTED: 40

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: GEOL CT 21: PALAEONTOLOGY	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-4	Taxonomy and systamatics- alpha taxonomy; phylogenetic systematic; species problem in palaeontology; bio, chrono and morphospecies.
5-8	Morphodynamics- growth and function; functional morphology; methods of morphodynamic analysis.
9-12	History of life, Precambrian life, Caambrian explosion and metazoan radiation, Burges shale fauna, Phanerozoic diversity
13-20	Ecology and palaeoecology- definition and spatio-temporal scales; ecologic principles; niche; limiting factors in ecology and palaeoecology; interaction with abiotic and biotic components(predation, competition, biological bulldozing); bivalve-brachiopod interaction; food wab complexity and ecologic interactions through time; ecologic parameters(richness, evenness and diversity); palaeobiogeography; application of stable isotope; macroecology(pattern, processes, Phanerozoic megatrends).
21-22	Taphonomy- definition; taphonomic filters; Phanerozoic trends(record vs bias).
23-25	Stratigraphy: Biozones and biostratigraphic classification; bio- and chronostratigraphic applications of fossils in Phanerozoic.
26-29	Evolution and Macroevolution- definition and spatio-temporal scales; theories; patterns; processes; Phanerozoic spatio-temporal megatrends.
30-31	Mass extinction and Conservation- major mass extinction episodes(cause and effect); the sixth mass extinction; conservation paleobiology.

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32-40	Critical evaluation of major mega-invertebrate groups- Echinoidea, Mollusca (Bivalves, Gastropods, Ammonites), Brachiopoda, Trilobita, Graptolithina.

NAME OF FACULTY : ASHIS KUMAR DAS

PAPER : GEOL CP 21: PALAEONTOLOGY PRACTICAL

LECTURES ALLOTED:

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: GEOL CP 21: PALAEONTOLOGY PRACTICAL	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-8	Cladistics- construction of cladogram and identification of ancestral and shared derived characters.
9-18	Functional morphology study- Bivalves, Brachiopods, Gastropods, Echinoids, Ammonites.
19-24	Ecology and palaeoecology- Study of ontogenetic change in shell shape and size in bivalves;

ADas.

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TEACHING PLAN FOR SEMESTER-4

NAME OF FACULTY : ASHIS KUMAR DAS

PAPER : GEOL OT 85: EXPLORATION GEOPHYSICS

LECTURES ALLOTED:

ALLOTED SYLLABUS:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	Basic principles of Geophysics; Detailed knoeledge of different types of geophysical methods involving gravity, electric and seismic.
3-8	Gravity potential and field due to different simple bodies and structures.
9-14	Electrical method: Introduction, self potential, earth resistivity, different arrays, profiling and sounding techniques, interpretation and field cases.
15-22	Seismic method: Introduction, refraction methods, layered earth refraction studies, hidden layer problem, correction, instruments, field procedures, interpretation.
23-26	Various well-logging techniques.

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NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

TEACHING PLAN FOR SEMESTER -1

NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

PAPER : CC-1-1-TH, CC-1-1-P

LECTURES ALLOTED: 80

ALLOTED SYLLABUS: unit-1, unit-2, unit 7

TOPIC/SUBTOPIC: CC-1-TH :Earth system science	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1	Unit-1: Branches of earth science
2-19	Unit-1:Origin of the universe, Origin of solar system and planets, Terrestrial and jovian planets, Earth in the solar system, Meteorites and asteroids
20-28	Unit-2: Mechanical layering of the earth, Earth's internal structure
28-36	Unit-2: Earthquake and seismic waves, seismic belts
37-45	Unit-2: Formation of core, mantle, crust, Earth's magnetic field
46-55	Unit-2:Formation of atmosphere,hydrosphere,biosphere
56-64	Unit-2: volcanoes and volcanism
65-69	Unit-7: nature of stratigraphic records, Fundamental laws of stratigraphy,plutonism, neptunism,catastrophism
TOPIC/SUBTOPIC:	CC-1-1-P: Practical
70-80	Earthquake, soil profile

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TEACHING PLAN FOR SEMESTER -3

NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

PAPER : CC-3-5-TH

LECTURES ALLOTED: 20

ALLOTED SYLLABUS: unit-6

TOPIC/SUBTOPIC: CC-3-5-TH : Igneous petrology-Petrogenesis	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-3	Unit-6: Petrogenesis of granitoids
4-7.	Unit-6: Petrogenesis of anorthosites
8-11.	Unit-6: Petrogenesis of alkaline rocks
12-17.	Unit-6: Petrogenesis of basaltic rocks
18-20.	Unit-6: Petrogenesis of ultramafic rocks
TOPIC/SUBTOPIC:	

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TEACHING PLAN FOR SEMESTER -5

NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

PAPER : CC-5-11 TH, CC-5-11P

LECTURES ALLOTED: 30

ALLOTED SYLLABUS: unit-1,2,3,5

TOPIC/SUBTOPIC:	CC-5-TH: Economic Geology
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-4	Unit-1: ore, tenor, primary ore, secondary ore, hypogene and supergene deposit,gangues
5-6	Unit-1: Ore beneficiation
7-9	Unit-1: Mineral resource and reserves
10-15	Unit-3: Formation of ore-exogenic process-placer deposit, Residual deposit, Supergene deposit
16-19	Unit-2: mineral occurrence, deposit, ore deposit, historical concept, Metallogenic epoch and province, concordant and discordant deposit
20-21	Unit-2: Mineral deposits and their litho-tectonic environments
22-25	Unit-5: metallic deposits of India—Fe,Cu,Mn,Pb,Zn,U, non-metallic deposits of India
TOPIC/SUBTOPIC:	CC-11 P : Practical
26-30	Preparation of map of metallic and non-metallic deposits

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TEACHING PLAN FOR SEMESTER -5

NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

PAPER : DSE-B TH, DSE-B-P

LECTURES ALLOTED: 20

ALLOTED SYLLABUS: DSE-B TH, DSE-B-P

TOPIC/SUBTOPIC: DSE-B-TH: Fuel Geology	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-6	Unit-1: origin of coal coal, coal petrology, Proximate and ultimate analysis, basic classification of coal
7	Unit-2: coal bed methane
8-10	Unit-3: Petroleum: origin of petroleum , Physical and chemical property of petroleum
11-13	Unit-4:Source of oil, reservoir of oil, migration of oil, Oil trap-different types, cap rocks
14-15	Unit-5: Nuclear fuel: uranium, thorium
TOPIC/SUBTOPIC	DSE-B Practical
16-20	Coal hand specimen, reserve estimation of coal

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TEACHING PLAN FOR SEMESTER -2(Applied Geology M.Sc)

NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

PAPER : CT-25

LECTURES ALLOTED: 24

ALLOTED SYLLABUS: Phanerozoic Stratigraphy

TOPIC/SUBTOPIC: CT-25-Phanerozoic Stratigraphy	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-16	Phanerozoic successions in different parts of India and their interrelationship with plate tectonics
17-20	Supercontinent cycle,paleoenvironment
21-24	Milankovitch cycle and rock record
TOPIC/SUBTOPIC:	

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TEACHING PLAN FOR SEMESTER –3 (Applied Geology M.Sc)

NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

PAPER : OT-81, OP-81,

LECTURES ALLOTED: 40

ALLOTED SYLLABUS: COAL

TOPIC/SUBTOPIC: OT-81-COAL	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-9	Physical, chemical, optical property of coal
10-12	Metamorphism of coal
13-15	Classification of coal
16-18	Petrology and palynology of coal,inorganic mineral matter
19-21	Formation of coal, correlation, Estimation of resources
22-27	Industrial utilization of coal
28-29	Indian resources, environmental management
TOPIC/SUBTOPIC:	OP-81-Coal
30-40	Practical- hand specimen, reserve estimation

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TEACHING PLAN FOR SEMESTER-IV((Applied Geology M.Sc)

NAME OF FACULTY : DR. INDRANI BHATTACHARYYA

PAPER : CP-43, CP-45

LECTURES ALLOTED:

ALLOTED SYLLABUS: earth science colloquium, thesis

TOPIC/SUBTOPIC: CP-43	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-6	Earth science colloquium
TOPIC/SUBTOPIC: CP-45	
60 (tentative)	Thesis

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NAME OF FACULTY: DIPANJAN MAZUMDAR

TEACHING PLAN FOR SEMESTER 1

NAME OF FACULTY: DIPANJAN MAZUMDAR

PAPER: **GEL-A-CC-1-2-TH (MINERAL SCIENCE)**
Unit 2 (ATOMIC ARRANGEMENT AND MINERAL STRUCTURE)
Unit 3 (ROCK FORMING MINERALS)
GEL-A-CC-1-2-P (MINERAL SCIENCE)…..

LECTURES ALLOTED: **(70)**
25 Unit 2. (ATOMIC ARRANGEMENT AND MINERAL STRUCTURE)
20 Unit 3. (ROCK FORMING MINERALS)
25 GEL-A-CC-1-2-P (MINERAL SCIENCE) Practical

ALLOTED SYLLABUS:

GEL-A-CC-1-2-TH (MINERAL SCIENCE)

TOPIC/SUBTOPIC: **Unit 2 (ATOMIC ARRANGEMENT AND MINERAL STRUCTURE)**	
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
1-7	Atomic arrangements: unit cell, CCP, FCC and HCP.
8-22	Ionic radius and coordination, Pauling's rules. Solid Solution, polymorphism, pseudomorphism.
23-25	Atomic structure of silicate minerals.
TOPIC/SUBTOPIC… **Unit 3: ROCK FORMING MINERALS**	
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
26-45	Composition of common rock-forming minerals – internal atomic structure, pyroxene, amphibole, and mica groups.

GEL-A-CC-1-2-P (MINERAL SCIENCE)

TOPIC/SUBTOPIC… **STUDY OF OPTICAL PROPERTIES OF COMMON ROCK-FORMING MINERALS:**	
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
46-63	Quartz, orthoclase, microcline, plagioclase, perthite, nepheline, olivine, orthopyroxene, clinopyroxene, hornblende, staurolite, garnet, muscovite, biotite, calcite, chlorite, epidote, kyanite, sillimanite, tourmaline, zirocon, sphene, zoisite, apatite.
64-70	Determination of scheme of pleochroism and extinction angles of hornblende

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TEACHING PLAN FOR SEMESTER 3

NAME OF FACULTY : DIPANJAN MAZUMDAR

PAPER: **Paper –GEL-A-CC-3-5-TH IGNEOUS PETROLOGY**
Paper – GEL-A-SEC-A-3-1-P FIELD WORK

LECTURES ALLOTED: **(47)** **Paper –GEL-A-CC-3-5-TH (IGNEOUS PETROLOGY)**
10, Unit 1 **Introduction to Igneous Petrology**
10 Unit 4 **Classification of Igneous rocks**
20 Unit 6 **Petrogenesis of Igneous rocks**
7 **Paper – GEL-A-SEC-A-3-1-P (FIELD WORK)**

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **GEL-A-CC-3-5-TH IGNEOUS PETROLOGY**	
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	**Unit 1: Introduction to Igneous Petrology** Modes of magma generation in the crust and upper mantle. Physical properties of magma - temperature, viscosity, density and volatile content. Modes of emplacement of igneous rocks: volcanic, hypabyssal, plutonic.
11-20	**Unit 4: Classification of Igneous rocks** Composition and texture of important igneous rocks: granitoids, pegmatite, syenite, monzonite, diorite, norite,gabbro, anthrothosite, dolerite, pyroxenites, peridotite, lamprophyres, carbonatite, rhyolite, andesite, dacite, basalt, komatiite.
21-40	**Unit 6: Petrogenesis of Igneous rocks** Magmatic processes; crystal settling in magma, magma convection, crystal mush theory, igneous cumulates, diversity of igneous rocks Petrogenesis of felsic and mafic igneous rocks: granitoids, basalt, anorthosite, alkaline rocks, ultramafic rocks.
TOPIC/SUBTOPIC: **Paper – GEL-A-SEC-A-3-1-P FIELD WORK**	
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
7 days	Topographic sheet: methods of naming. Features, scale. Map reading. Use of topographic sheets in field. Marking location in topographic sheet using physical features and bearing. Identification of rock types in field. Identification of primary and secondary structures in field. Clinometer and Brunton compass: use of the instruments in measuring geological data in field. Techniques of measurement of orientation data in field. Litholog measurement Recording field data in maps and notebooks. Report writing.

Dipanjan Mazumdar

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TEACHING PLAN FOR SEMESTER 4

NAME OF FACULTY: DIPANJAN MAZUMDAR

PAPER:

Paper – GEL-A-CC-4-8-TH: (METAMORPHIC PETROLOGY)
Unit 1: Metamorphism: Controls and Types
Unit 2: Metamorphic Facies and Grades. Metamorphic Structures and Textures
Unit 3: Metamorphic reactions. Metamorphism and deformation.
Unit 4: Migmatites and their origin
Unit 5: Metamorphic rock associations and Plate Tectonic settings

Paper –GEL-A-CC-4-8-P (METAMORPHIC PETROLOGY)

Paper –GEL-A-CC-4-9-TH (STRATIGRAPHIC PRINCIPLES AND INDIAN STRATIGRAPHY)
Unit 5: Physiographic and tectonic subdivisions of India
Unit 6: Precambrian Stratigraphy

Paper –GEL-A-CC-4-9-P (STRATIGRAPHIC PRINCIPLES AND INDIAN STRATIGRAPHY)

LECTURES ALLOTED: **110**

(40) GEL-A-CC-4-8-TH: (Metamorphic Petrology)

(30) GEL-A-CC-4-8-P (Metamorphic Petrology)

(30)GEL-A-CC-4-9-TH (Stratigraphic Principles and Indian Stratigraphy)

(10) GEL-A-CC-4-9-P (Stratigraphic Principles and Indian Stratigraphy)

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	**GEL-A-CC-4-8-TH: METAMORPHIC PETROLOGY**
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT

1-7	**Unit 1: Metamorphism: Controls and Types** Definition of metamorphism. Factors controlling metamorphism, Types of metamorphism – contact, regional, fault zone metamorphism, impact metamorphism. Causes of metamorphism and concept of metamorphic P-T-t paths.
8-20	**Unit 2: Metamorphic Facies and Grades. Metamorphic Structures and Textures** Index minerals, metamorphic zones and isograds. Structure and textures of metamorphic rocks. Concept of metamorphic facies and grade.Mineralogical phase rule of closed and open system. Composition-paragenesis diagrams. ACF, AKF and AFM diagrams. Metamorphic products of pelitic, carbonate and mafic igneous rocks.
21-28	**Unit 3: Metamorphic reactions. Metamorphism and deformation.** Progressive and retrogressive metamorphism. Prograde and retrograde metamorphic minerals reactions. Relationship between metamorphism and deformation.
29-34	**Unit 4: Migmatites and their origin** Metasomatism and role of fluids in metamorphism. Brief idea of crustal anatexis. Migmatites and its origin. Metamorphic differentiation.
35-40	**Unit 5: Metamorphic rock associations and Plate Tectonic settings** Regional occurrence and tectonic significance of metamorphic rocks: metamorphism along convergent plate margins, in continent-continent collisions, in rifting terrains and sea floor metamorphism. Metamorphic belts of India.

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TOPIC/SUBTOPIC:	**GEL-A-CC-4-8-P: METAMORPHIC PETROLOGY**
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
41-70	Hand specimen study of following metamorphic rocks: slate, phyllite, schist, gneiss, amphibolite, charnockite, khondalite, mafic granulite, marble. Textural and mineralogical study of following metamorphic rocks in thin sections: slate, varieties of schists, gneiss, amphibolite, charnockite, khondalite, mafic granulite, eclogite, marble, high Mg-Al granulites. Graphical plots of metamorphic mineral assemblages using chemographic diagrams (ACF and AKF) in greenschist and amphibolite facies.

TOPIC/SUBTOPIC:	**GEL-A-CC-4-9-TH (STRATIGRAPHIC PRINCIPLESAND INDIAN STRATIGRAPHY)**
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
1-8	**Unit 5: Physiographic and tectonic subdivisions of India** Brief introduction to the physiographic and tectonic subdivisions of India.
9-30	**Unit 6: Precambrian Stratigraphy** Introduction to Indian Shield Concept of Archean nucleus: Dharwar and Singhbhum Introduction to Proterozoic basins of India. Geology of Vindhyan and Cudappah basins of India

TOPIC/SUBTOPIC:	**GEL-A-CC-4-9-P (STRATIGRAPHIC PRINCIPLESAND INDIAN STRATIGRAPHY)**
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
31-40	Study of geological map of India and identification of major Precambrian stratigraphic units. Drawing of various paleogeographic maps of Precambrian time

Dipanjan Majumdar

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TEACHING PLAN FOR SEMESTER 5

NAME OF FACULTY: DIPANJAN MAZUMDAR

PAPER: **Paper –GEL-A-CC-5-11-TH (ECONOMIC GEOLOGY)**
Paper –GEL-A-CC-5-11-P (ECONOMIC GEOLOGY)

LECTURES ALLOTED: **(30)**
20 **Paper –GEL-A-CC-5-11-TH**
10 **Paper –GEL-A-CC-5-11-P**

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **Paper –GEL-A-CC-5-11-TH (ECONOMIC GEOLOGY)**	
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	**Unit 3: Structure and texture of ore deposits** Endogenous processes: magmatic concentration, skarns, greisens, and hydrothermal deposits.
10-20	**Unit 5: Metallic and Nonmetallic ores** Non-metallic and industrial rocks and minerals in India. Introduction to gemstones.
TOPIC/SUBTOPIC: **Paper –GEL-A-CC-5-11-P (ECONOMIC GEOLOGY)**	
LECTURE	PROPOSED TOPIC(S) TO BE TAUGHT
21-30	Hand sample identification of important ores and nonmetallic minerals. Study of microscopic properties of ore forming minerals (oxides and sulphides).

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TEACHING PLAN FOR SEMESTER 1

NAME OF FACULTY: DIPANJAN MAZUMDAR

PAPER: **Geol CT12: Geochemistry and Isotope Geology**
Geol CT13: Mineralogy
Geol C T14: Igneous Petrology
Geol CP12: Geochemical and Mineralogical Techniques
Geol CP14: Igneous Petrology

LECTURES ALLOTED: 84

ALLOTED SYLLABUS: **19 Geol CT12: Geochemistry and Isotope Geology**
21Geol CT13: Mineralogy
20Geol C T14: Igneous Petrology
3Geol CP12: Geochemical and Mineralogical Techniques
21Geol CP14: Igneous Petrology

Geol CT12: Geochemistry and Isotope Geology

TOPIC/SUBTOPIC:	**GEOL CT12: GEOCHEMISTRY AND ISOTOPE GEOLOGY**
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	The atmosphere: structure and composition of atmosphere; geochemical cycle of nitrogen. The evolution of atmosphere; constancy of atmospheric composition; Formation and destruction of ozone layer, Ozone hole.
11-19	The Hydrosphere: distribution of water on the earth; average compositions of sea water, river water and ground water; gains and losses of the oceans, balance of the dissolved matter in sea water, origin and evolution of sea water, chemical evolution of ground water, lithological control on the quality of groundwater.
TOPIC/SUBTOPIC…	**GEOL CP12: GEOCHEMICAL AND MINERALOGICAL TECHNIQUES**
LECT NO	
1-2	Determination of slow and fast vibration directions of minerals, scheme of pleochroism.
2-3	Determination of anorthite content of plagioclase by symmetric extinction angle method.
TOPIC/SUBTOPIC	**GEOL CT13: MINERALOGY**
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	Brief idea on the internal structure of Pyroxene, Amphibole and Mica (with relevantclassification schemes) and site- occupancy of cations

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11-15	Olivine: Brief structural characters, anti-ordering in olivine, olivine- spinel transitions and its geodynamic significance.
16-20	Spinel Group: Different types of spinels and their internal structures.
21	Phase transition in the mantle

TOPIC/SUBTOPIC	**GEOL CT14: IGNEOUS PETROLOGY**
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-9	Large Igneous Provinces, mant le plumes and related magmatism
10-12	Brief idea on physical volcanolog y, criteria for identification of several volcanic flows, distinct zones within a flow, common volcanic structures, pyroclasts.
13-18	General idea on layered complex, salient features of Stillwater, Skaergaard complexes.
19-20	Carbonatite and ophiolites genesis, emplacement and classification

TOPIC/SUBTOPIC:	**GEOL CP 14 : : IGNEOUS PETROLOGY**
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
21-31	Study of hand specimens of representative igneous rocks.
32-41	Study of thin sections of different plutonic , volcanic and Bushveld and restitic igneous rocks with emphasis to understand relevant petrogene sis.

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TEACHING PLAN FOR SEMESTER 2

NAME OF FACULTY: DIPANJAN MAZUMDAR

PAPER: **GEOL CT25: STRATIGRAPHY**
GEOL CP23: METAMORPHIC PROCESSES AND PHASE EQUILIBRIA

LECTURES ALLOTED: 56
34, GEOL CT25: STRATIGRAPHY
22, GEOL CP23: METAMORPHIC PROCESSES AND PHASE EQUILIBRIA

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **GEOL CP23: METAMORPHIC PROCESSES AND PHASE EQUILIBRIA**	
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-20	Description metamorphic rocks under microscope and their identification.
	Identification of equilibrium mineral assemblages and chemogrpahic relation.
	Interpretation of metamorphic textures with reference to time relations between the phases of deformation and recrystallization of minerals such as chloritoid, garnet, staurolite, kyanite and magnetite.
	Identification of metamorphic facies from a set of thin sections of metamorphic rocks.
21-22	Graphical representation of the metamorphic assemblages and model metamorphic reactions in ACF, AKF and AFM diagrams.

TOPIC/SUBTOPIC: **Geol CT25: Stratigraphy**	
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-3	General principles: Building-up of a regional stratigraphy; boundary problem
4-6	Difficulties in the application of Laws of Stratigraphy in older rocks, especially the Archean rocks. Additional tools, at times the only tools: geochemistry, isotope dating, and geodynamic modelling.
7-12	Well preserved rock record of the early Earth in most of the continents – the general character of Archean rock record. The major components: greenstone belts, and the high grade terrane.
13-19	General characters of greenstone belts- petrology, geochemistry and tectonics, the controversy and confusion over the name ‘greenstone’ belt.
20-26	High grade terranes and their main constituents Tonalite- Trondhjemite- Granodiorite (TTG). Their typical characters - mainly geochemical. Differences between post-Archean granitoids and the TTGs. The geodynamic significance of TTG – melting of oceanic basalts – the tectonic

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	scenario subduction zone, oceanic plateau etc. Use of trace elements Ta-Nb. Brief overview of importance of zircon (U-Pb, initial Hf, continental vs oceanic), Sm-Nd and Pb-Pb systematic, and Geochron.
27	Sanukitoids – the rock marking the Archean – Proterozoic boundary.
28-30	Some rock restricted to Archean e.g. BIF, Komatiite, some variety of tholeiite, and herringbone carbonate. Most emphasis on Komatiite to understand the thermal structure of Earth in the Archean.
31	The oldest preserved crustal material –its significance using U-Pb systematics, and oxygen isotope results.
32-34	TTG, plate tectonics in the early Earth, and birth of continents

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TEACHING PLAN FOR SEMESTER 3

NAME OF FACULTY: DIPANJAN MAZUMDAR

PAPER: **GEOL CT31: ENVIRONMENTAL GEOLOGY & GEOTECHNICAL ENGINEERING**
GEOL OT81: ENERGY RESOURCES

LECTURES ALLOTED (28):

GEOL CT31: ENVIRONMENTAL GEOLOGY & GEOTECHNICAL ENGINEERING **20 LECTURES**

GEOL OT81: ENERGY RESOURCES **8 LECTURES**

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	**GEOL CT31:ENVIRONMENTAL GEOLOGY AND GEOTECHNICAL ENGINEERING**
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-13	Environmental impact assessment: air, soil, groundwater, flora-fauna, and ecosystem; waste management of energy resources; pollution of environmental and its mitigation
14-16	The environmental impact of mining, beneficiation, and smelting
17-19	Climate change and global warming
19-20	Role of man in environment (Anthropocene and Neo-mass extinction)

TOPIC/SUBTOPIC:	**GEOL OT81: ENERGY RESOURCES**
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-8	Nuclear Energy Geochemistry of U and Th, geochemical abundance of radioactivity in crustal rocks, important minerals, types of U and Th deposits, nuclear raw material resources of India, usage of nuclear energy. Potential alternative (renewable) energy sources such as Geothermal, solar, wind, tidal, biomass, etc.

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TEACHING PLAN FOR SEMESTER 4

NAME OF FACULTY: DIPANJAN MAZUMDAR

PAPER:

Geol OT85: Exploration Geophysics
Geol CP43: Earth Science Colloquium
Geol C45: Thesis

LECTURES ALLOTED: 48 lectures plus 90 hours field work and lab guidance
Geol OT85: Exploration Geophysics (20 lectures),
Geol CP43: Earth Science Colloquium (8 lectures),
Geol C45: Thesis (20 lectures, plus field work and lab guidance)

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: Geol OT85: Exploration Geophysics	
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-20	Magnetic methods: introduction, magnetic properties ofrocks, geomagnetic field, field procedure, measurement of magnetic ano malies, interpretation.
TOPIC/SUBTOPIC: Geol CP43: Earth Science Colloquium	
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
1-8	Compulsory seminar presentation by students on geologically important themes based on published papers

TOPIC/SUBTOPIC: Geol C45: Thesis (written and viva)	
LECT NO	PROPOSED TOPIC(S) TO BE TAUGHT
60-80 hours	Field work and laboratory guidance

Dipanjan Mazumdar

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NAME OF FACULTY: RWITI BASU

TEACHING PLAN FOR SEMESTER 1

NAME OF FACULTY : RWITI BASU

PAPER : GEL-A-CC-1-2-TH (Mineral Science)

LECTURES ALLOTED: 30

ALLOTED SYLLABUS: Unit 4

TOPIC/SUBTOPIC:	Unit 4: Crystal Optics
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-6	Nature of light and optical behaviour of crystals
7-8	Introduction to petrological microscope
9-14	Theory of light propagation in isotropic, uniaxial, and biaxial crystals.
15-30	Principles of orthoscopic and conoscopic studies of minerals under optical microscope.

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TEACHING PLAN FOR SEMESTER 2

NAME OF FACULTY : RWITI BASU

PAPER : Paper –GEL-A-CC-2-4-Th (STRUCTURAL GEOLOGY)

LECTURES ALLOTED: 16

ALLOTED SYLLABUS: Unit 1, Unit 2

TOPIC/SUBTOPIC: Unit 1	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-5	Structural elements: planar and linear structures, concept of strike and dip, trend and plunge, rake/pitch.
6-8	Concept of scale of observation of structures. Topographic maps. Outcrop patterns of different structures.
TOPIC/SUBTOPIC: Unit 2: Stress and Strain in Rocks	
9-12	Basic concept of rock deformation
13-16	Concept of brittle and ductile deformation.

NAME OF FACULTY : RWITI BASU

PAPER : Paper –GEL-A-CC-2-4-P (STRUCTURAL GEOLOGY)

LECTURES ALLOTED: 48

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-5	True dip and apparent dip problems, 3-point problems
6-8	Stereographic projections of planes and lines.
9-16	fold problems, fault problems and their solutions through stereographic projection methods

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17-18	Basic idea of topographic maps. Topographic sheets of various scales. Interpretation of topographic maps
19-31	Interpretation of geological maps with unconformity, fault, fold and igneous bodies.
32-34	Construction of structural cross section.
35-48	Doubt clearing and remedial classes

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TEACHING PLAN FOR SEMESTER 3

NAME OF FACULTY : RWITI BASU

PAPER : GEL-A-CC-3-5-TH (IGNEOUS PETROLOGY)

LECTURES ALLOTED: 50

ALLOTED SYLLABUS: Unit 3, Unit 4, Unit 5,

TOPIC/SUBTOPIC: Unit 4: Classification of Igneous rocks	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-4	Bases of classification of igneous rocks: mineralogical, textural, chemical, chemico-mineralogical and associational.
4-5	Norm and mode.
6-16	Standard classification schemes – Shand, Hatch and Wells, and IUGS. TAS diagram for volcanic rocks
TOPIC/SUBTOPIC: Unit 3: Texture and Microstructure of Igneous rocks	
17-20	Crystallinity, granularity, shapes and mutual relations of grains
21-23	Nucleation and growth of igneous minerals contd..
24-28	Description of the following textures and microstructures with their occurrence in different rocks – panidiomorphic, ……. amygdaloidal
TOPIC/SUBTOPIC: Unit 5: Phase Diagrams	
29	Phase rule and its application to eutectic, peritectic and solid solution system
30-32	Phase equilibria in the following binary and ternary systems, and their petrogenetic significance: albite – anorthite
33-34	Phase equilibria in the following binary and ternary systems, and their petrogenetic significance: diopside – anorthite
35-36	Phase equilibria in the following binary and ternary systems, and their petrogenetic significance: forsterite – silica
37-38	Phase equilibria in the following binary and ternary systems, and their petrogenetic significance: albite – orthoclase

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TOPIC/SUBTOPIC: Unit 4: Classification of Igneous rocks	
39	Outline of CIPW classification
40-41	Composition and texture of important igneous rocks
TOPIC/SUBTOPIC: Unit 5: Phase Diagrams	
42-44	Phase equilibria in the following binary and ternary systems, and their petrogenetic significance: diopside – albite – anorthite
45-47	Phase equilibria in the following binary and ternary systems, and their petrogenetic significance: forsterite – diopside – silica
48-50	Phase equilibria in the following binary and ternary systems, and their petrogenetic significance: nepheline – kalsilite – silica

PAPER : GEL-A-CC-3-5-P (IGNEOUS PETROLOGY)

LECTURES ALLOTED: 22

ALLOTED SYLLABUS: Full paper

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-4	Plotting of mode in IUGS classification of plutonic rocks
5-11	Study of important igneous rocks in thin sections
12-18	Norm calculation of silica saturated igneous rocks
19-22	Study of important igneous rocks in thin sections contd..

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TEACHING PLAN FOR SEMESTER 4

NAME OF FACULTY : RWITI BASU

PAPER : GEL-A-CC-4-10-Th PHANEROZOIC STRATIGRAPHY OF INDIA

LECTURES ALLOTED: 12

ALLOTED SYLLABUS: Unit 2

TOPIC/SUBTOPIC:	Unit 2: Volcanic provinces of India
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-8	Deccan, Rajmahal, Sylhet Trap
9-12	Remedial

NAME OF FACULTY : RWITI BASU

PAPER : Paper –GEL-A-SEC-B-4-1-P (FieldWork)

LECTURES ALLOTED: 7 days in field + 10

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
Day 1-7	Map reading and geological mapping stratigraphic and biogeographic correlation using fossils Preparation of a geological map of a small area with homoclinal or gently folded beds. Stereographic plots of orientation data and their interpretation.
1-10	Report writing.
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TEACHING PLAN FOR SEMESTER 5

NAME OF FACULTY : RWITI BASU

PAPER : Paper –GEL-A-CC-5-12-TH (ENGINEERING GEOLOGY)

LECTURES ALLOTED: 47

ALLOTED SYLLABUS: Unit 4, Unit 5, Unit 6, Unit 7

TOPIC/SUBTOPIC: Unit 4: Intact Rock and Rock Mass properties	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	Intact Rock and Rock Mass properties
3-7	Rock aggregates; significance as construction material.
TOPIC/SUBTOPIC: Unit 5: Rock Quality Designation (RQD)	
7-8	Rock Quality Designation (RQD)
9-12	Concept, mechanism and significance of: Rock Structure Rating(RSR)
13-18	Rock Mass Rating(RMR)
19-22	Tunneling Quality Index (Q)
23-27	Geological, Geotechnical and Environmental considerations for dams and reservoirs
TOPIC/SUBTOPIC: Unit 7: Landslides	
28-29	Landslides
30-35	Causes, factors and corrective/preventive measures
TOPIC/SUBTOPIC: Unit 6: Tunnels	
36-42	Tunneling methods
43-47	Doubt clearing and remedial

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PAPER : Paper –GEL-A-CC-5-12- P (ENGINEERING GEOLOGY)

LECTURES ALLOTED: 25

ALLOTED SYLLABUS:

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-12	Computation of RQD, RSR, RMR, and 'Q
13-22	Computation of Index properties of rocks contd..
22-25	Doubt clearing and remedial

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TEACHING PLAN FOR MSc in Applied Geology

TEACHING PLAN FOR SEMESTER 3

NAME OF FACULTY : RWITI BASU

PAPER : Geol CT31: Environmental Geology and Geotechnical Engineering

LECTURES ALLOTED: 40

ALLOTED SYLLABUS: Geotechnical Engineering

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	Introduction to earth processes and natural hazards
3-12	Geotechnical properties of soils and rocks
13-18	Slope stability and mass wasting; landslides and related hazards
19-22	Earthquake; hazard assessment and mitigation
23-36	Engineering structures: dam, tunnels, roads, bridges; selection of sites for construction
37-40	Earth's processes affecting engineering structures

PAPER : Geol CP31: Environmental Geology and Geotechnical Engineering (Practical)

LECTURES ALLOTED: 24

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-6	Stability of mass, RQD calculation
7-18	Analysis of discontinuities in rocks for estimating stability of surface
19-21	Determination of void ratio, degree of saturation, amount of consolidation, compaction in soil
22-24	Preparation and interpretation of engineering geologic maps including face maps, subsurface maps and diagrams, hazard zonation maps, etc.

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PAPER: Geol CP43: Earth Science Colloquium
Geol C45: Thesis (written and viva)

LECTURES ALLOTED: Geol CP43 – 5 Geol C45 - 60

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **Geol CP43: Earth Science Colloquium**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
5 Lectures (Tentatively)	Compulsory seminar presentation by students on geologically important themes based on published papers.
TOPIC/SUBTOPIC: **Geol CP45: Thesis (written and viva)**	
60 hours (Tentatively) often with field work	Thesis

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NAME OF FACULTY : ARPITA SAMANTA

TEACHING PLAN BSc Semester 1

NAME OF FACULTY : ARPITA SAMANTA

PAPER : GEL-A-CC-1-1-TH, EARTH SYSTEM SCIENCE

LECTURES ALLOTED: 2/per week

ALLOTED SYLLABUS: Unit3, Unit4, Unit 6 and Unit7

TOPIC/SUBTOPIC: Unit 3: Cosmic abundance of elements	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	Distribution of elements in solar system and in Earth
3-6	Composition of the Earth. General concepts about geochemical cycles.
7-8	Properties of common elements in Earth.
9-10	Concepts of geochemical cycles
TOPIC/SUBTOPIC: Unit 4: Hydrosphere and Atmosphere	
11-12	Oceanic current system and effect of Coriolis force
13-14	Concepts of eustasy.
15-16	Land-sea interaction: Wave erosion and beach processes
17-18	Atmospheric circulation.

TOPIC/SUBTOPIC: Unit 6: Soil	
19-22	Soils: types, soil profile, processes of formation of soil
TOPIC/SUBTOPIC: Unit 7: Understanding the past from Stratigraphic records	
23-30	Concept of radiometric dating. Radiometric dating of rocks and minerals: U-Pb, Pb-Pb, K-Ar, Rb-Sr, Sm-Nd methods. Dating igneous and sedimentary rocks.

31-32	Geological time scale.

BSc Semester 2

Paper –GEL-A-CC-2-3-TH [4 CREDITS]

ELEMENTS OF GEOCHEMISTRY

LECTURES ALLOTED: 8/per week

ALLOTED SYLLABUS: Full syllabus

TOPIC/SUBTOPIC: Unit 1: Basic Concepts	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1	The periodic table.
2	Chemical bonding, states of matter and atomic environment of elements
3	Geochemical classification of elements.
4	Cosmic abundance of elements in earth and meteorites.

TOPIC/SUBTOPIC: Unit 2: Layered Structure of Earth and Geochemistry	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
5-8	Composition of crust: Continental and Oceanic
9-12	Composition of mantle: depleted mantle and enriched mantle.
13-14	Composition of core.
15-16	Bulk chemical Composition of the Earth
17-30	Isotope geology – radiogenic and stable isotopes in Earth materials.
31-35	Principles of radioactive dating(Rb-Sr method).
TOPIC/SUBTOPIC: Unit 3: Element transport	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT

36	Abundance of elements in river and ocean water
37	Constancy of elemental composition of ocean water
38-40	Concept of ionic and redox potential and pH
41-50	Aqueous geochemistry- basic concepts and speciation in solutions, Eh, pH relations.
51-60	Factors controlling chemical sedimentation.
TOPIC/SUBTOPIC: Unit 4: Geochemistry of solid Earth	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
61-70	Geochemical variability of magma and its products. Melting processes

TOPIC/SUBTOPIC: Unit 5: Geochemical behaviour of selected Elements during Magmatic Fractionation	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
71-80	Si, Al, K, Na, Ca, Fe, Mg, Ti.

Paper –GEL-A-CC-2-3-P [2 CREDITS]

ELEMENTS OF GEOCHEMISTRY

LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
81-130	Geochemical variation diagrams and its interpretations: bivariate and trivariate plots to delineate the control of different compositional variables: Harker variation diagram, AFM diagram, MgO diagram. Chemical variation diagrams based on major elements: the alkali-lime index, iron enrichment index, aluminum saturation index and alkalinity index diagrams.

PAPER :GEL-A-SEC-B-4- 1-P Field Work

LECTURES ALLOTED: 7 days

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: GEL-A-SEC-B-4- 1-P Field Work	
7 Days	• Map reading and geological mapping • stratigraphic and biogeographic correlation using fossils

	• Preparation of a geological map of a small area with homoclinal or gently folded beds. • Stereographic plots of orientation data and their interpretation. • Report writing.

BSc. Semester 3

Paper –GEL-A-CC-3-6-TH [4 CREDITS]

SEDIMENTARY PETROLOGY

LECTURES ALLOTED: 8/per week

ALLOTED SYLLABUS: Full syllabus

TOPIC/SUBTOPIC:	Unit 1: Introduction to Sedimentology
1-6	Scope of sedimentology, origin of sediments, classification of sedimentary rocks based on composition and texture.
TOPIC/SUBTOPIC: Unit 2: Granulometry: Textural parameters of clastic sediments	
7-14	Grain size: concept and size scale; particle shape and fabric; sedimentary textures. grain size analyses and environmental connotation
TOPIC/SUBTOPIC: Unit 3: Basic Hydraulics and Sedimentary Structures: sediment transport mechanism	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
15-22	Fluid flow: flow rheology, fluid gravity flow, sediment gravity flow, flow regime, laminar and turbulent flow, particle entrainment in fluid flow.
23-26	Mass flow: types and deposits
27-40	Sedimentary structure: primary and penecontemporaneous deformation structures, biogenic structures.
41-46	Paleocurrent analysis: data acquisition, methodology, different palaeocurrent patterns.
TOPIC/SUBTOPIC: Unit 4: Sedimentary rocks	
47-50	Siliciclastic rocks: components and classification(s) of conglomerates, sandstones, mudrocks.

51-60	General introduction to carbonate rocks, BIF, chert;
61-70	Components and classifications of limestone, dolomites and dolomitisation.

TOPIC/SUBTOPIC: Unit 5: Sedimentary environments	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
71-72	Classification, sedimentary facies.
73-86	Facies models for glacier, meandering, fluvial, deltaic, and shelf depositional settings
TOPIC/SUBTOPIC: Unit 6: Diagenesis	
87	Concepts of diagenesis
88-90	Stages of diagenesis: diagenetic changes in sand and carbonate deposits, lithification.

Paper –GEL-A-CC-3-6-P [2 CREDITS]

SEDIMENTARY PETROLOGY

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
91-110	Identification of sedimentary structures in hand specimens.
111-116	Statistical analysis of particle size distribution.
117-118	Paleocurrent analysis.
119-130	Petrographic study of clastic and non-clastic rocks in thin sections.

BSc. Semester 6

LECTURES ALLOTED: 4/per week

Paper –GEL-A-CC-6-14-TH [4 CREDITS]

GEOMORPHOLOGY, REMOTESENSING ANDGIS

Unit 3 and 4

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TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	Surficial processes and geomorphology; weathering and associated landforms.
11-35	Landforms produced by glacial, periglacial processes, fluvial processes, aeolian processes, coastal processes
36-40	Landforms associated with igneous activities.
41-45	Endogenic-exogenic interactions; rates of uplift and denudation; tectonics and drainage development; sea-level change; long-term landsacape development
46-50	Landform dating techniques.

Paper – GEL-A-DSE-A-6-1-P [2 CREDITS]

EARTH AND CLIMATE

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	Study of distribution of major climatic regimes of India on map
3-6	Distribution of major wind patterns on World map
7-15	Numerical exercises on interpretation of proxy records for palaeoclimate

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TEACHING PLAN FOR MSc in Applied Geology

NAME OF FACULTY : ARPITA SAMANTA

Semester-1

PAPER : Geol CT12: Geochemistry and Isotope Geology

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Geol CP13: Field Geology 50 Practical 02 (7 days)

LECTURES ALLOTED: 6/per week

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	Branches of Geochemistry; earth in relation to Solar system and Universe.
3-10	Meteorites: definition, age, importance of study; classification and its basis, mineralogical characteristics and contrast with terrestrial mineralogy, broad chemical characteristics, brief outline on origin.
11-20	Nucleosynthesis; cosmic abundance of elements; Geochemical classification of elements; average chemical composition of continental crust, oceanic crust, entire crust, mantle, core and entire earth; methods of computation of these average compositions; Geochemical differentiation of primordial earth.
21-35	Chemical Geodynamics, Chemical evidence for mantle heterogeneity, Lead paradox, DUPAL anomaly, mode of occurrence of trace elements in igneous rocks; behavior of trace elements during magmatic crystallization.
36-45	General chemical characteristics of sedimentary rocks; role of ionic potential; hydrogen ion concentration and oxidation- reduction potential in sedimentation; Eh- pH diagrams of Mn- H_2 O systems and Fe-H_2O systems with and without CO_2.
46-75	Isotope Geology: Stable and radioactive isotopes, cosmogenic isotopes, stable and Radiogenic isotope geochemistry, principles and methods of radioactive dating; Application of isotopes in Geology.

Geol CP12: Geochemical and Mineralogical Techniques

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TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
76-85	Determination of igneous rock suite using variation diagrams
86-96	Trace element modeling in fractional crystallization and partial melting processes.

Semester-2

Geol CT22: Sedimentology and Basin Analysis

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-6	Sediment gravity flows-classification and transport mechanisms and depositional products.
7-10	Concepts of sedimentary environments, its control and classification.
11-60	Facies analysis: Principles, facies models and environmental reconstructions of principal siliciclastic environments in continental, transitional and marine realm. Carbonate depositional system.
61-65	Siliciclastics: Origin , Diagenesis, Provenance and tectonic reconstructions.
66-75	Carbonates: controls of carbonate deposition, constituents of limestone, its mineralogy and diagenesis. Dolomite and dolomitisation.
76-80	Definition, mineralogy, classifications and occurrence of volcanoclastics, chert and evaporite.
TOPIC/SUBTOPIC:	
81-90	Basin analysis: Classification and mechanics of formation of major basin types, subsidence analysis, fill character and modelling techniques.
91-100	Seismic and sequence stratigraphy.

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Geol CP22: Sedimentology

TOPIC/SUBTOPIC:	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
101-110	Description and interpretation of sedimentary structures in hand specimens.
111-115	Palaeocurrent analysis, granulometric analysis of sediments and interpretation.
116-130	Granulometric analysis and interpretation of siliciclastic and carbonate rocks under microscope
131-135	Geochemical data interpretation .
136-140	Facies correlation from lithologs.

PAPER: Geol CP43: Earth Science Colloquium
Geol C45: Thesis (written and viva)

LECTURES ALLOTED: Geol CP43 – 5 Geol C45 - 60

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **Geol CP43: Earth Science Colloquium**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
5 Lectures (Tentatively)	Compulsory seminar presentation by students on geologically important themes based on published papers.
TOPIC/SUBTOPIC: **Geol CP45: Thesis (written and viva)**	
60 hours (Tentatively) often with field work	Thesis

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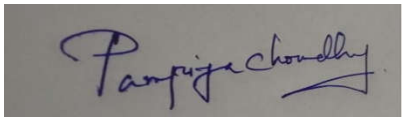
NAME OF FACULTY: PAMPIYA CHOWDHURY

TEACHING PLAN FOR SEMESTER 1

PAPER : GEL-A-CC-1-1-TH EARTH SYSTEM SCIENCE
GEL-A-CC-1-1-TH: EARTH SYSTEM SCIENCE (Unit -2, Unit -5)
GEL-A-CC-1-1-P: EARTH SYSTEM SCIENCE (Topic -1)
LECTURES ALLOTED: 26 GEL-A-CC-1-1-TH: EARTH SYSTEM SCIENCE (Unit -2, Unit -5)
10 GEL-A-CC-1-1-P: EARTH SYSTEM SCIENCE (Topic -1)

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: Unit 5: Plate Tectonics in GEL-A-CC-1-1-TH EARTH SYSTEM SCIENCE	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-2	Historical development of the concept of continental drift and plate tectonics.
3-5	Plates and plate boundaries.
6-12	Geodynamic elements of Earth: mid oceanic ridges, trenches, transform faults and island arcs
13-17	Plate tectonics: mountain belts and rift valleys.
	Unit-2:
18-22	Concept of isostasy.
23-26	Convection in Earth's core and production of its magnetic field. Geothermal gradient and internal heat of the Earth.
TOPIC/SUBTOPIC: **Paper –GEL-A-CC-1-1-P EARTH SYSTEM SCIENCE**	
1-5	Study of major geomorphic features and their relationships with outcrops through maps and physiographic models.
6-10	Detailed study of topographic sheets and preparation of physiographic description of an area



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TEACHING PLAN FOR SEMESTER 4

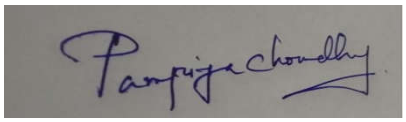
NAME OF FACULTY : Pampiya Chowdhury

PAPER : **GEL-A-CC-4-9-TH Principals of STRATIGRAPHIC PRINCIPLESAND INDIAN STRATIGRAPHY**

LECTURES ALLOTED – 24 **GEL-A-CC-4-9-TH**

ALLOTED SYLLABUS

TOPIC/SUBTOPIC: **Principals of STRATIGRAPHIC PRINCIPLESAND INDIAN STRATIGRAPHY**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	**Unit 1:** Principles of stratigraphy Fundamentals of litho-, bio- and chrono-stratigraphy Introduction to concepts of dynamic stratigraphy (chemostratigraphy, seismic stratigraphy, sequencestratigraphy, magnetostratigraphy)
11-17	**Unit 2:** Code of stratigraphic nomenclature International Stratigraphic Code – development of a standardized stratigraphic nomenclature. Concepts of Stratotypes. Global Stratotype Section and Point (GSSP). Principles of stratigraphy and principles of Precambrian stratigraphy**.**
18-20	**Unit 3:** Facies concept in stratigraphy Walther's Law of Facies
21-24	**Unit 4:** Paleogeography Concept of paleogeographic reconstruction



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TEACHING PLAN FOR SEMESTER 5

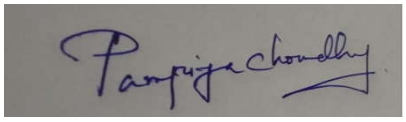
NAME OF FACULTY : Pampiya Chowdhury

PAPER : **GEL-A-CC-5-12-P ENGINEERING GEOLOGY**

LECTURES ALLOTED: **10 GEL-A-CC-5-12-P ENGINEERING GEOLOGY (Topic- 1)**

ALLOTED SYLLABUS

TOPIC/SUBTOPIC: **GEL-A-CC-5-12-P ENGINEERING GEOLOGY**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-4	Computation of reservoir area,
5-10	catchment area, reservoir capacity and reservoir life.



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TEACHING PLAN FOR SEMESTER 6

NAME OF FACULTY : Pampiya Chowdhury

PAPER : GEL-A-CC-6-13-TH Hydrology

GEL-A-CC-6-13-P Hydrology

LECTURES ALLOTED 30 GEL-A-CC-6-13-TH Hydrology

18 GEL-A-CC-6-13-P Hydrology

ALLOTED SYLLABUS

TOPIC/SUBTOPIC: GEL-A-CC-6-13-TH Hydrology	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	**Unit 1:** Introduction and basic concepts Scope of hydrogeology and its societal relevance Hydrologic cycle: precipitation, evapo-transpiration, run-off, infiltration and subsurface movement of water. Rock properties affecting groundwater, Vertical distribution of subsurface water Types of aquifer, aquifer parameters, anisotropy and heterogeneity of aquifers
11-18	**Unit 2:** Groundwater flow Darcy's law and its validity Intrinsic permeability and hydraulic conductivity Groundwater flow rates and flow direction Laminar and turbulent groundwater flow
19-21	**Unit 3:** Groundwater provinces Groundwater provinces of India and West Bengal
22-25	**Unit 4:** Groundwater chemistry Physical and chemical properties of water and water quality Sea water intrusion in coastal aquifers
26-30	**Unit 5:**

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	Groundwater management Surface and subsurface water interaction Groundwater level fluctuations Basic concepts of water balance studies, recharge and discharge Rainwater harvesting and artificial recharge of groundwater
TOPIC/SUBTOPIC: GEL-A-CC-6-13-P Hydrology	
1-5	Study of major geomorphic features and their relationships with outcrops through maps and physiographic models.
6-8	Water potential zones of India (map study).
9-18	Graphical representation of chemical quality data and water classification (C-S and Trilinear diagrams) Simple numerical problems related to: determination of permeability in field and laboratory,

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TEACHING PLAN FOR SEMESTER 6

NAME OF FACULTY : Pampiya Chowdhury

PAPER : GEL-A-CC-6-14-TH GEOMORPHOLOGY, REMOTESENSING ANDGIS

GEL-A-CC-6-14-P GEOMORPHOLOGY, REMOTESENSING ANDGIS

LECTURES ALLOTED 12 GEL-A-CC-6-14-TH GEOMORPHOLOGY, REMOTESENSING ANDGIS

12 GEL-A-CC-6-14-P GEOMORPHOLOGY, REMOTESENSING ANDGIS

ALLOTED SYLLABUS

TOPIC/SUBTOPIC: GEL-A-CC-6-14-TH GEOMORPHOLOGY, REMOTESENSING ANDGIS	
1-4	**Unit 5:** Photogeology Types and acquisition of aerial photographs; scale and resolution; principles of stereoscopy, relief displacement, vertical exaggeration and distortion. Elements of air photo interpretation. Identification of sedimentary, igneous and metamorphic rocks and various aeolian, glacial, fluvial and marine landforms.
5-7	**Unit 6:** Remote Sensing Concepts in Remote Sensing. Sensors and scanners. Satellites and their characteristics. Data formats- Raster and Vector
8-9	**Unit 7**: Digital Image Processing Image classification
10-12	**Unit 8:** GIS and GPS Datum, Coordinate systems and projection systems. Concepts of GPS. Integrating GPS data with GIS. Applications of GPS in earth system sciences.
TOPIC/SUBTOPIC: GEL-A-CC-6-14-P GEOMORPHOLOGY, REMOTESENSING ANDGIS	

LEC. NO.	Reading topographic maps. Preparation of topographic profile.

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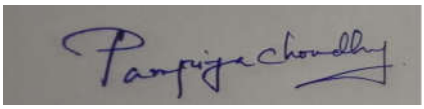
1-4	Preparation of longitudinal profile of a river. Calculating stream length gradient index.
5-7	Morphometry of a drainage basin. Interpretation of geomorphic processes from the geomorphology of the area.
8-12	Aerial photo interpretation: identification of sedimentary, igneous and metamorphic rocks and various aeolian, glacial, fluvial and marine landforms.



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TEACHING PLAN FOR MSc in Applied Geology

NAME OF FACULTY : Pampiya Chowdhury

PAPER : Geol CT15: Hydrogeology and Water management

Geol CP15: Hydrogeology and Water management

LECTURES ALLOTED: 34 Geol CT15: Hydrogeology and Water management

22 Geol CP15: Hydrogeology and Water management

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	Geol CT15: Hydrogeology and Water management
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-10	Hydrological Cycle and processes: systems concept of hydrological cycle, precipitation, evaporation and transpiration, run off, baseflow, infiltration, global and Indian distribution of water resource.
11-16	Groundwater Hydrology: origin of groundwater, subsurface profile of groundwater, classification of rocks with respect to water bearing characterizes, geomorphic and geologic occurrence and flow controls of groundwater, groundwater provinces in India; Aquifers - unconfined, confined, and semi-confined; water table and piezometric surface; genetic classification of groundwater

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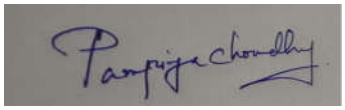
17-27	Hydrological Characterizes of Aquifer: porosity, void ration, permeability, transmissivity, storativity, specific yield, specific retention, diffusivity, velocity; elasticity of confined aquifers. Laws of groundwater movement: Bernoulli's equation, Darcy's Law, Laplace equation, flow nets, steady and unsteady unidirectional flow; radial flow
28-34	Groundwater Management: recharge and discharge areas; safe yield and overdraft; land subsidence; rain water harvesting and artificial recharge; consumptive and conjunctive use of water; conservation of water; water shed management.
TOPIC/SUBTOPIC: Geol CP15: Hydrogeology and Water management	
1-10	Preparation and interpretation of hydrologic maps,
11-14	hydrologic interpretations from aerial photographs and satellite images; measuring precipitation, evapotranspiration,
15-22	recharge estimation; groundwater monitoring; water balance calculations; hydrologic report



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TEACHING PLAN FOR SEMESTER 3

NAME OF FACULTY : Pampiya Chowdhury

PAPER : Geol CT32:Remote Sensing and GIS

Geol CP32:Remote Sensing and GIS

LECTURES ALLOTED: 34 Geol CT32:Remote Sensing and GIS

22 Geol CP32:Remote Sensing and GIS

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC:	Geol CT32:Remote Sensing and GIS
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-15	Basic concepts of remote sensing: definition, scope, advantages, and limitations; EMR, EM spectrum, atmospheric windows; Interaction with target, specular and Lambertian (diffuse) reflectors; black, white, and grey (natural) bodies; spectral reflectance curves; ideal and real RS systems; platforms (vehicles with ladders, cranes, scaffoldings, tall buildings, kites, pigeons, balloons, aircrafts, space crafts, satellites) and censors (film and digital aerial cameras, optical mechanical scanners, CCD linear arrays, radiometers, spectrometers, altimeters, depth meters, distance meters, RADAR, TV); types of resolutions; passive and active RS systems.
16-20	Indian space program from INCOSPAR (1962) till date. Introductory photogrammetry: flight planning, scale, overlap, sidelap, relief displacement, radial line methods and instruments; stereovision, stereoscopy, stereometry, vertical exaggeration, satellite cartography: orientation, triangulation, stereomodel compilation, DPM/DEM
21-23	Photographs: terrestrial and aerial-vertical and oblique (low and high), images: PAN, multispectral, FCC, hyperspectral, thermal, RADAR, LIDAR, ground trothing, GPS, DGPS.
24-25	Visual image interpretation: elements, keys, generation of maps and profiles/sections. Digital image processing and interpretation
26-34	GIS: definitions, scope, concepts, advantages and limitations; spatial and attribute data, raster and vector data models; topology; surface models: point, lattice, contour, TIN, DEM, DBMS; procedures; software.
TOPIC/SUBTOPIC: Geol CP32: Remote Sensing and GIS	

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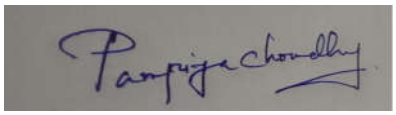
1-8	Interpretation of stereo pairs of vertical air photos under pocket and mirror stereoscopes; interpretation of MSS and FCC images; visual and digital interpretation of digital images; use of GIS and image processing software
9-12	Stereo tests; interpretation of single air photos and single band/PAN satellite images including border/annotation lines information (metadata)
13-22	Georeferencing, supervised and unsupervised classification of natural fractures. Preparation of DEM

Geol CP31:Environmental Geology and Geotechnical Engineering

LECTURES ALLOTED: 20

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: Geol CP31:Environmental Geology and Geotechnical Engineering	
1-20	Sampling and analysis of water and soil



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TEACHING PLAN FOR SEMESTER 4

NAME OF FACULTY : Pampiya Chowdhury

PAPER : Geol CT42: Mineral Exploration, Mining & Beneficiation

Geol CP42: Mineral Exploration, Mining & Beneficiation

LECTURES ALLOTED: 30 Geol CT42: Mineral Exploration, Mining & Beneficiation

26 Geol CP42: Mineral Exploration, Mining & Beneficiation

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: Geol CT42: Mineral Exploration, Mining & Beneficiation	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
1-3	National mineral policy; classification of mineral deposits, discovery types, stages of exploration: reconnaissance permits, large area prospecting, prospecting license, mining lease, mineral deposits and host rocks.
4-6	Geological exploration: surface signatures like stratigraphy, weathering (gossan), structures (fold, fault, lineament, shear, breccia), old mining activities (India)
7-12	Geochemical exploration: soil, rock, stream sediments, hydrogeochemical, biogeochemical, geobotanical, atmogeochemical, and electrogeochemical.
12-16	Drilling technology: percussion, diamond, reverse circulation, air core, wireline, BH deviation survey
17-30	Sampling: pitting, trenching, channel, chip, drill core/ non-core, bulk/muck/grab/car/stack sampling; reduction, accuracy and challenges; QCR, QA analysis Reserve estimation: cut-off, ROM, cross section, long section, level plan and inverse distance; classification of reserves/resources (conventional, USGS, UNFC, and JORC) Mining terminologies: surface and underground (soft and hard rock) Beneficiation: general beneficiation techniques of Pb, Zn, and Cu sulfides, Fe ores Exploration rick management and parameters for success Hazards of mineral industries Exploration case studies
TOPIC/SUBTOPIC: Geol CP42: Mineral Exploration, Mining & Beneficiation	
1-26	Problems on ore reserve estimation from surface and sub-surface sampling data.

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PAPER: Geol CP43: Earth Science Colloquium
Geol C45: Thesis (written and viva)

LECTURES ALLOTED: Geol CP43 – 5 Geol C45 - 60

ALLOTED SYLLABUS:

TOPIC/SUBTOPIC: **Geol CP43: Earth Science Colloquium**	
LEC. NO.	PROPOSED TOPIC(S) TO BE TAUGHT
5 Lectures (Tentatively)	Compulsory seminar presentation by students on geologically important themes based on published papers.
TOPIC/SUBTOPIC: **Geol CP45: Thesis (written and viva)**	
60 hours (Tentatively) often with field work	Thesis

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