



**DEPARTMENT OF GEOSCIENCES
KRANTIGURU SHYAMJI KRISHNA
VERMA
KACHCHH UNIVERSITY**



**MASTER OF SCIENCE
IN
GEOLOGY
(2 Year Programme)
(FACULTY OF SCIENCE)**

ACADEMIC YEAR 2026-27

SYLLABUS

CURRICULUM AS PER

**UNIVERSITY GRANT COMMISSION (UGC)
GUIDELINES FRAMED ACCORDING TO
NATIONAL EDUCATION POLICY (NEP)-2020 GUIDELINE
WITH EFFECT FROM JUNE - 2026**

SUBMITTED BY

**DEPARTMENT OF GEOSCIENCES
KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
BHUJ- MUNDRA ROAD, BHUJ, KACHCHH- 370001**

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thesis, preparing graduates to mitigate geological hazards, manage groundwater resources, protect geoheritage, and lead interdisciplinary geoscientific initiatives.

PROGRAMME OUTCOMES (POs)

Upon successful completion of the M.Sc. Geology programme, graduates will demonstrate the following technical and professional capabilities:

- **PO-1: Geoscientific Knowledge:** Ability to synthesize, classify, and interpret rock-forming minerals, structural architectures, stratigraphic columns, and planetary surface processes from macro-to-micro scales.
- **PO-2: Problem Analysis & Subsurface Modeling:** Competency to analyze complex geological problems, generate predictive subsurface structural profiles, and evaluate groundwater budgets, aquifer properties, and energy reservoir dimensions.
- **PO-3: Quantitative & Lab Instrumentation Skills:** Mastery over quantitative calculations, including geochemical weight percentages, radionuclide decay constants, fluid hydraulics parameters, and the digital processing of elemental spectra and mineral orientations.
- **PO-4: Modern Surveying & Tool Usage:** Technical adaptability to deploy advanced geomatics hardware (DGPS, Total Station, and Drones) and leverage industry-standard software suites for automated watershed analysis and structural landform mapping.
- **PO-5: Field Investigation & Documentation:** Proficiency in executing rigorous outdoor geological data mapping, strategic sedimentary logging, representative rock/ore sampling, and safe environmental site assessments.
- **PO-6: Environmental Ethics & Sustainability:** Deep commitment to designing and regulating sustainable mining procedures, trace-element pollution remediations, disaster risk-reduction policies, and community-centric geoconservation matrix frameworks.
- **PO-7: Professional Communication & Teamwork:** Capacity to draft specialized technical reports, present defensible scientific arguments in academic or corporate forums, and function effectively as a lead collaborator in multidisciplinary workforces.



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CREDIT STRUCTURE

Year	Semester	Major Courses	Skill Enhancement Course (SEC)	Total Credits
1 st	I	5 (4 Credits) = 20	1 (2 Credits) = 02	22
	II	5 (4 Credits) = 20	1 (2 Credits) = 02	22
2 nd	III	5 (4 Credits) = 20	1 (2 Credits) = 02	22
	IV	5 (4 Credits) = 20	1 (2 Credits) = 02	22
		80	08	88




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EXTENDED COURSE STRUCTURE

SEMESTER-I

Course Category	Paper Code	Title of the Paper	Field details	Credits (T+P)
Major Course	MJGE-101	Structural Geology and Geotectonics	Field Visit to structurally and tectonically important sites	4+0
	MJGE-102	Igneous Petrology and Metamorphic Petrology	Field Visit to igneous and Metamorphic terrains	4+0
	MJGE-103	Geomorphology and Landscape Evolution	Field Visit to various Geomorphological landscape)	4+0
	MJGE-104	Advanced Mineralogy, Crystallography and Instrumentations	Field Visit to various mineral rich terrains of India	4+0
	MJGE-105	Combined Practical: Structural Geology and Geotectonics: Map Sections, Stereographic projection of the structural features etc. Igneous Petrology and Metamorphic Petrology: Megascopic and microscopic rocks, Norms calculation Geomorphology and Landscape Evolution: Geomorphic Analysis using maps, toposheets and softwares, Landscape Evolutionary Models Advanced Mineralogy, Crystallography and Instrumentations: megascopic, microscopic minerals and elemental composition of minerals and rocks, Elements of Symmetry, Miller Indices, HM symbols, stereographic projections; identification of forms with models.		0+4
Skill Enhancement Course (SEC)	SCGE-106	Field Techniques in Geology	A field excursion of minimum 10 days in igneous/ metamorphic/ sedimentary/ Quaternary terrain is compulsory	0+2
TOTAL CREDITS				22



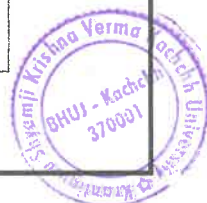
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Department of Geology
 Kuvempu University, Gulbarga
 Gulbarga-570001

EXTENDED COURSE STRUCTURE

SEMESTER-II

Course Category	Paper Code	Title of the Paper	Field details	Credits (T+P)
Major Course	MJGE-201	Principal of Stratigraphy, Sedimentology and Advanced Paleontology	Field Visit to Stratigraphic significant sites, diverse sedimentary terrain and paleontological important sites	4+0
	MJGE-202	Geology of India with special emphasis on Gujarat	Field Visit to Various Geological Terrains of Gujarat and India	4+0
	MJGE-203	Geochemistry and Isotope Geology	Academic Visit to geochemical and geochronological institute/industries	4+0
	MJGE-204	Quaternary Geology and Geoarchaeology	Field Visits to geomorphologically, Quaternary and geoarchaeologically important sites	4+0
	MJGE-205	Combined Practical: Principal of Stratigraphy, Sedimentology and Advanced Paleontology: Petrography, Grain size analysis, sieving for sedimentary environment, Stratigraphic Reconstruction, fossils identification, micropalaeontology, ichnofacies Geology of India with special emphasis on Gujarat: Maps, Stratigraphic Reconstructions Geochemistry and Isotope Geology: Calculation of Atomic Wt. %, Isotopes, K-Ar, Rb-Sr, Sm-Nd Radionuclide Decay Quaternary Geology and Geoarchaeology: Preparation of Geomorphological maps through RS and GIS, Morphometric Analysis etc., Geoarchaeological Artifacts Studies	LAB (Satellite Image Interpretation, GIS Software- QGIS, Global Mapper, Surfer etc.)	0+4
Skill Enhancement Course (SEC)	SCGE-206	Remote Sensing and GIS		1+1
TOTAL CREDITS				22



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EXTENDED COURSE STRUCTURE

SEMESTER-III

Course Category	Paper Code	Title of the Paper	Field details	Credits (T+P)
Major Course	MJGE-301	Oceanography, Climatology and Planetary science	Academic Visits to Institutes pertaining to Oceanic, Climate and Meteorological Science and Field Visits to Planetary Science Analog Sites, Academic Visits to the Planetary Institutes/ Industries	4+0
	MJGE-302	Geophysics, Seismology, Geodesy and Engineering Geology	Academic Visits to the Seismological and Geophysical Institutes/ Industries, Engineering Geological Sites	4+0
	MJGE-303	Environmental Geology and Disaster Management	Field Visits related to Disaster Vulnerable Sites, Academic Visits to the relevant institutes	4+0
	MJGE-304	Fuel Geology	Field Visit to Coal Mines and Hydrocarbon prospective formations, Hydrocarbon Industries and Allied Research Institutes	4+0
	MJGE-305	Combined Practical: Oceanography, Climatology and Planetary science: Analysis of Meteorological Data, Study of Ocean Sediments, Maps, Models. Geophysics, Seismology, Geodesy and Engineering Geology: Geophysical Surveys, Geophysics and Seismic Data Interpretation, Seismic Surveys, Data Interpretation, Geotechnical Analysis, Maps. Environmental Geology and Disaster Management: Maps, Disaster Management Models, Water and Soil testing, Maps Fuel Geology: Use of calorimeter for coal and petroleum, Interpretation of borehole and seismic data for the reservoir identification		0+4
Skill Enhancement Course (SEC)	SCGE-306	Internship on Geosciences	Labs and Field Visit (Academic Institute, Research Institute, Fieldwork at Government, Private, Industrial, NGO etc. sectors)	0+2
TOTAL CREDITS				22



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EXTENDED COURSE STRUCTURE

SEMESTER-IV

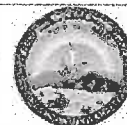
Course Category	Paper Code	Title of the Paper	Field Visits	Credits (T+P)
Major Course	MJGE-401	Economic and Mining Geology	Field visits to the mining sites and various ore deposits terrains.	4+0
	MJGE-402	Geoheritage, Geoconservation and Geotourism	Field Visits to geoheritage and geotourism sites	4+0
	MJGE-403	Hydrogeology	Field Visits for well monitoring and well data collections, visits to groundwater management institutes/NGOs	4+0
	MJGE-404	Dissertation	Dissertation with any of the faculties of the academic Institutes of the university or other universities, Scientists of the any research institutes, Experts from industry or Government or NGO Sectors etc.	4+0
	MJGE-405	Combined Practical: Economic and Mining Geology: Maps, Megascopic and microscopic Economic Minerals and Ore, Model of mining Process. Geoheritage, Geoconservation and Geotourism: Maps, TWOS and SWOT Assessment of Geoheritage Sites Hydrogeology: Groundwater Investigation, Water Quality Testing, Preparation of subsurface profiles, watershed mapping through GIS and RS, Drilling site visit.		0+4
Skill Enhancement Course (SEC)	SCGE-406	Field Techniques in Surveying and Software Application in Applied Geosciences	Labs and Field Visit (Geotechnical Analysis, Academic Institute, Research Institute, Fieldwork at Government, Private, Industrial, NGO etc. sectors)	0+2
TOTAL CREDITS				22



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ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Major Paper- 1: Structural Geology and Geotectonics	Credits:	4
Semester:	I	Paper Code: MJGE-101	Hours:	60

Objectives:	The course aims to provide students with a solid grounding in the fundamentals of stress, strain, rock deformation mechanisms and fracture mechanics, and to develop their ability to apply these concepts to natural rock bodies. Through systematic study of folds, faults, joints, foliations, lineations, boudinage and shear zones, students will learn to identify, describe and classify structural features and to interpret their formation mechanisms and kinematic significance. Emphasis on practical skills will enable students to collect and analyse orientation and strain data, use fault-kinematic indicators, and construct and interpret balanced cross-sections. The course also introduces plate-tectonic principles, paleomagnetism, mantle plume dynamics and the links between tectonic regimes and surface structural patterns, reinforced by relevant case studies. Fieldwork at structurally and tectonically important sites will train students to integrate field observations with theoretical knowledge, produce accurate geological documentation and reports, and apply structural geology concepts to regional tectonic problems, resource exploration and geological hazard assessment.
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COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Stress; Stress at 2D and 3D; Fracture mechanics; Mechanics of rock fracturing: fracture initiation and propagation; Coulomb's criterion and Griffith's theory; Geometrical analyses of joints and their importance; Mechanical aspects of fracturing and joint formation. Strain analysis: deformation mechanism at different scales, dislocation and diffusion creep, strain hardening and softening; Behavior of rocks under stress- elastic, plastic, viscous and visco-elastic responses and their geological significance; Concepts of petrofabrics and symmetry.	15 hrs.
UNIT-2	THEORY Fold: Classification and Mechanisms of Folds; Distribution of Stress and Strain in folds; Fold interference and superposed folds; Different types of planar and linear structures in deformed rocks; Lineations; Foliation; Boudinage; Shear Zones and its associated structures; Shear sense indicators.	15 hrs.
UNIT-3	THEORY Fault: Classification and Mechanisms of Faults; Distribution of Stress and Strain in faults; kinematics indicators of fault; Concept of fault zone weakening; fault reactivation and its significance; Concept of balanced cross sections. Joints: Joints with relation to folds and faults. Joints in relation to tectonic cycle, Orientation analyses of joints.	15 hrs.
UNIT-4	THEORY Plate motions and driving mechanism of tectonic plates; Paleomagnetism and polar wander path; Plate Tectonics: Concepts and boundaries, mantle plumes; Seafloor spreading, triple junctions; Case studies of the orogenic belts, hot spots, mantle plumes, convection and mechanism, Tectonic Setting, Oceanic ridges, Ophiolites, Cratons and passive margins; Continental rifts, Arc systems, Orogens, Tectonic features of extensional, compressional, and strike-slip-terrains and relevance to plate boundaries.	15 hrs.

Field Details: Field Visit to structurally and tectonically important sites.

REFERENCES

1.	Ghosh, S. K. (2013). Structural geology: Fundamentals and modern developments. Elsevier.
2.	Billings, M. P. (1972). Structural geology. Prentice Hall of India Pvt. Ltd..
3.	Fossen, H. (2016). Structural geology. Cambridge university press.
4.	Davis, G. H., Reynolds, S. J., & Kluth, C. F. (2011). Structural geology of rocks and regions. John Wiley and Sons.
5.	Ramsay J. G. (1967), Folding and fracturing of Rocks, McGraw Hill Pub.
6.	Ramsay J.G. and Huber M. I., (1983). The Techniques of Modern Structural Geology, Strain Analysis, Academic Press.
7.	G.W.Chiplonkar (1962) Geological Maps. Dastane Ramchandra & Co. Pune.
8.	Marshak, S., & Mitra, G. (1988). Basic methods of structural geology.
9.	Hobbs, B.E., Means, W.D. and Williams, P.F. An outline of structural geology, John Wiley, 1976.
10.	Paor, D. Structural Geology and Personal Computer, Pergamon, 1996.
11.	Rowland, S.M. and Duebendorfer, E.M. Structural Analysis and Synthesis, Pergamon, 1994.
12.	D M Ragan Structural Geology An Introduction to Geometrical Techniques, John Wiley, 1985.
13.	Kent C. Condie, Plate Tectonics and Crustal Evolution, 4th Edition.
14.	Kearey P and F.J. Vine, Global Tectonics. Blackwell scientific Publications.
15.	Frisch, W., Meschede, M., Blakey, R.C. Plate Tectonics: Continental Drift and Mountain Building. Springer. (2011).
16.	Kearey, P., Klepeis, K.A., Vine, F.J. Global Tectonics. Wiley Blackwell. (2009)

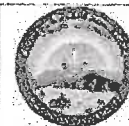


		DEPARTMENT OF GEOSCIENCES FACULTY OF SCIENCE KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY ACADEMIC YEAR- 2026-27			
Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)					
Year:	1	Major Paper- 2: Igneous and Metamorphic Petrology		Credits:	4
Semester:	I	Paper Code: MJGE-102		Hours:	60
Objectives:	The course aims to give students a thorough understanding of the origin, evolution and classification of igneous and metamorphic rocks, integrating petrogenetic theory with field and laboratory observations. Students will learn the physical and chemical processes that generate magmas—partial melting, fractional crystallization, assimilation and magma mixing—and apply phase equilibria, trace-element behaviour and IUGS classification to interpret magmatic systems and rock suites in diverse tectonic settings. The programme develops skills to recognise and describe textures, structures and field relations of volcanic and plutonic bodies, and to evaluate petrogenetic models for granitoids, layered intrusions, ophiolites, and other magmatic associations. In metamorphic petrology, students will master the agents and types of metamorphism, metamorphic facies and facies series, reaction textures and P-T-t-d paths, and will use mineral assemblages and geochemical diagrams (AFM, AKF, ACF) to reconstruct metamorphic histories for a variety of protoliths. Fieldwork in igneous and metamorphic terrains will train students to integrate petrographic, geochemical and field data, and to apply petrological concepts to regional tectonics, mineral exploration and crustal evolution problems.				
COURSE CONTENT / SYLLABUS					
UNIT-1	THEORY	Evolution and formation of magma and magmatic systems; Magmatic differentiation, assimilation and partial melting; texture and structures of igneous rocks; Chemical and mineralogical classification; IUGS classification of igneous rocks; Crystallization paths Phase rule and binary and ternary systems; Concept of batch melting, fractional melting; Role of trace elements in igneous systems.			15 hrs.
UNIT-2	THEORY	Various rock suits: Calc Alkaline, sub alkaline and alkaline volcanic and plutonic rocks; Field relations of volcanic and plutonic rock bodies (e.g. Plutons, pyroclastics, etc.) with major case studies. Magmatic and Petrotectonic association (MORB, Flood basalts, arc magmatism, ophiolites, Kimberlites, volcanic arcs, plutonic arcs, anorthosite, lamprophyres etc. with major case studies); Genesis and classification of Granitoids; Layered mafic intrusions.			15 hrs.
UNIT-3	THEORY	Introduction to Metamorphism: Agents, changes, types of metamorphism; metamorphic grade; Types of protolith, Classification of metamorphic rocks; Metamorphism of Foliated, lineated; non foliated and non-lineated rocks; Structures and Textures of metamorphic rocks; Origin of fabrics in metamorphic system.			15 hrs.
UNIT-4	THEORY	Concept of Metamorphic facies; Metamorphic facies series: Barrovian, Buchan and high-pressure facies, Metamorphic fluids: Types of metamorphic fluids, Metamorphism of pelites, mafic ultramafic rocks, siliceous and dolomites; Metamorphic reactions: Polymorphic reactions, exsolution, solid-solid net transfer, devolatilization, continuous, ion exchange, oxidation/reduction reactions; AFM, AKF, ACF diagrams, Migmatites; P-T-t-d path construction.			15 hrs.
Field Details: Field Visit to igneous and Metamorphic terrains.					
REFERENCES					
1.	Winter, J. D. (2014). Principles of igneous and metamorphic petrology. Pearson.				
2.	Philpotts, A., & Ague, J. (2009). Principles of igneous and metamorphic petrology. Cambridge University Press.				
3.	Bose M.K. (1997). Igneous Petrology.				
4.	White, W. M. (2020). Geochemistry. John Wiley & Sons.				
5.	Robin Gill (2010) Igneous Rocks and Processes: a practical guide. John Wiley& Sons.				
6.	Srivastava, Rajesh K. and Chandra, R., (1995): Magmatism in Relation to Diverse Tectonic Settings, A.A. Balkema, Rotterdam.				
7.	Myron G. Best Igneous and Metamorphic Petrology, CBS Publishers.				
8.	Anthony Hall Igneous Petrology, Longman, 1987.				
9.	Carmichael, I.S.E., J. Igneous Petrology, McGraw Hill 1974.				
10.	Cox, K.G. Bell, J.D. and Pankhurst, R.J. Interpretation of Igneous Rocks. George Ullen & Unwin 1979.				
11.	Wilson, M. Igneous Petrogenesis. Unwin Hyman 1990.				
12.	Blatt, H., Tracy, R.J. and Edwards, B. Petrology: Igneous, Sedimentary and Metamorphic Freeman, 2006.				
13.	Phillpots A., Introduction to igneous and metamorphic petrology. Prentice Hall Pub, New Delhi.				
14.	Ehlers, E.G. and Blatt, H., Petrology: Igneous, Sedimentary and Metamorphic Freeman, 1982.				
15.	Turner, F. J., & Verhoogen, J. (1960). Igneous and metamorphic petrology.				
16.	Barker, A. J. (2013). Introduction to metamorphic textures and microstructures. Routledge.				
17.	Yardley, B., & Warren, C. (2021). An introduction to metamorphic petrology. Cambridge University Press.				





**DEPARTMENT OF GEOSCIENCES
FACULTY OF SCIENCE
KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Major Paper- 3: Geomorphology and Landscape Evolution	Credits:	4
Semester:	I	Paper Code: MJGE-103	Hours:	60

Objectives:	The course aims to equip students with a comprehensive understanding of the processes that shape Earth's surface and the principles of landscape evolution. Students will study weathering, erosion, mass movement and pedogenesis, and learn to identify and interpret fluvial, glacial, eolian, coastal, lacustrine, karst and submarine landforms, with emphasis on the geomorphology of India. The course introduces competing models of landscape evolution and the roles of climate, tectonics and sea-level change as controlling factors, enabling students to evaluate and apply these models to real-world terrains. Instruction in soil terminology, soil formation factors, soil properties and recognition of palaeosols will provide grounding for linking surficial processes to sedimentary records. Practical training in geomorphological mapping, morphometric analysis and GIS/DEM-based landscape analysis will develop students' skills in data acquisition, quantitative interpretation and reporting. Field visits to representative geomorphological sites will consolidate classroom learning and prepare students to apply geomorphological concepts to environmental assessment, hazard evaluation and land-use planning.
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COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Dynamics of Geomorphology: Erosion and Weathering processes; pedogenesis and mass movement; Geomorphic processes and landforms –fluvial, glacial, eolian, lacustrine, coastal and karst (erosional and depositional landforms), Submarine relief; Geomorphology of India: Geomorphological features and zones.	15 hrs.
UNIT-2	THEORY Models of landscape evolution-Evolutionary cycle, slope replacement model, pediplanation model, equilibrium model. Introduction to controlling factors of landscape evolution-climate, tectonics and sea level change.	15 hrs.
UNIT-3	THEORY Soil terminology, components, soil profile and discrimination, Factors affecting soil formation, soil properties-physical and chemical; Recognition and characteristics of palaeosols.	15 hrs.
UNIT-4	THEORY Geomorphological mapping – analog and digital techniques, Morphometric analyses of drainage basins-morphometric indices, analysis and interpretation using GIS, DEM-types of DEMs, data sources and landscape analysis.	15 hrs.

Field Details: Field Visit to various Geomorphological landscape.

REFERENCES

1.	Thornbury, W.D. Principles of Geomorphology, Wiley Eastern, 1993.
2.	Huggett, R., & Shuttleworth, E. (2022). Fundamentals of geomorphology. Routledge.
3.	Savindra Singh. Physical Geography. Pravalika Publications, Allahbad.
4.	Bloom Arthur L, Geomorphology: A Systematic analysis of late Cenozoic landforms.
5.	G.B. Mahapatra. Textbook of Physical Geology.

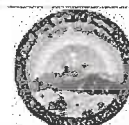


		DEPARTMENT OF GEOSCIENCES FACULTY OF SCIENCE KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY ACADEMIC YEAR- 2026-27			
Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)					
Year:	1	Major Paper- 4: Advanced Mineralogy, Crystallography and Instrumentations		Credits:	4
Semester:	I	Paper Code: MJGE-104		Hours:	60
Objectives:	The course aims to give students an advanced and integrated understanding of mineralogy, crystallography and the instrumentation used in modern mineralogical investigations. Students will learn crystal chemistry, atomic structure and the diagnostic physical and chemical properties of major mineral groups, enabling accurate identification and classification of rock-forming and ore minerals. The programme develops competence in optical mineralogy and petrographic microscopy, including measurement of refractive indices, interference figures, birefringence and determination of optic sign and orientation, and trains students in thin-section techniques and photomicrography. Instruction in crystallography covers unit cells, Bravais lattices, point groups, space groups, symmetry operations and lattice defects, as well as polymorphism, polytypism and polysomatism, fostering ability to relate crystal structure to mineral properties. Hands-on training in sample preparation, analytical methods (XRD, XRF, AAS), luminescence techniques, modal analysis, etching and staining will enable students to acquire, process and interpret mineralogical data for petrological, economic and environmental applications. Field visits to mineral-rich terrains will consolidate theoretical knowledge and improve practical skills in sample collection, documentation and reporting.				
COURSE CONTENT / SYLLABUS					
UNIT-1	THEORY	Atomic structures and mineral/ crystal chemistry; Diagnostic properties of rock forming minerals; All silicates, sulphates, carbonates, native minerals, sulphides, oxides, sulfosalts, hydroxides, halides, nitrates, borates, chromates, phosphates. Significance of Mineralogy.			15 hrs.
UNIT-2	THEORY	Optical mineralogy; Petrological microscope; Properties of light, polarization, interference of light waves, Measurement of RI, Pleochroism, Birefringence, Optic orientation in different crystallographic systems. Determination of optic sign of uniaxial and biaxial minerals, Determination of optic axial Angle, Conoscopic or convergent polarized light; Generation of Uniaxial and Biaxial interference figures; Forms of interference figures related to sections Optical accessories like mica, gypsum and quartz plates; Determination of Optic sign of uniaxial and biaxial minerals.			15 hrs.
UNIT-3	THEORY	Definition of Crystal Classification of crystals into Crystal systems, Concept of unit cell Proper and improper symmetry operations, Concept of Space lattice Derivation of 14 Bravais lattices HCP, Lattice defects (point, line and planar), Classification of crystals into 32 Point Groups, Concept of Space Group, Natural symmetry, Transformation of minerals polymorphism, polytypism, and polysomatism.			15 hrs.
UNIT-4	THEORY	Instrumentation and Analytical Techniques: Sampling and Sample preparation, Thin section and polished section making, Techniques in photomicrography, Sample etching, staining and modal count techniques, Principles and geological applications of Luminescence, Atomic Absorption Spectroscopy X-ray Fluorescence spectroscopy, X-ray diffractometry.			15 hrs.
Field Details: Field Visit to various mineral rich terrains of India.					
REFERENCES					
1.	Klein, C., <i>Manual of Mineral Science</i> . 11nd edition, Wiley (2018).				
2.	J. D. Dana, <i>Manual of Mineralogy</i> , New Haven, 1871.				
3.	Dexter Perkins, <i>Mineralogy</i> . Pearson (2015).				
4.	Kerr, P. F. and Rogers, A.F., <i>Optical Mineralogy</i> . McGraw-Hill, 1977.				
5.	Read, H.H. <i>Rutley's Elements of Mineralogy</i> , CBS Publishers and Distributors. (1960).				
6.	Donald Bloss, <i>Crystallography and Crystal chemistry</i> , Holt Rinehart and Winstar Jr., 1971.				
7.	Kerr, P. F. and Rogers, A.F., <i>Optical Mineralogy</i> . McGraw Hill, 1977.				
8.	Deer, W.A, Howie, R.A., and Zussman, J. <i>An Introduction to rock forming minerals</i> , Longman, 1966.				
9.	Berry, L.G. and Mason, B. <i>Mineralogy</i> , Freeman, 1957.				
10.	Hutchinson, C.S. 1974: <i>Laboratory Handbook of Petrographic Techniques</i> . John Wiley.				





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ACADEMIC YEAR- 2026-27



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Major Paper- 5: Combined Practical	Credits:	4
Semester:	I	Paper Code: MJGE-105	Hours:	120

Objectives:	The combined practical course is designed to give students intensive hands-on training across structural geology, petrology, geomorphology and mineralogy so they can apply classroom theory to real-world data and samples. Students will develop practical skills in field mapping, map-section construction and stereographic projection for structural analysis; megascopic and microscopic description of igneous and metamorphic rocks, modal counts and normative calculations for petrogenetic interpretation; geomorphic mapping and quantitative landscape analysis using toposheets, maps, DEMs and relevant software to test landscape-evolution models; and mineral identification, crystallographic indexing (Miller indices, Hermann-Mauguin symbols), symmetry analysis and basic instrumental methods for elemental and phase analysis. Emphasis on careful sample collection, preparation, documentation, photomicrography and report writing will prepare students to integrate laboratory and field results for regional geological interpretation, resource evaluation and problem-solving in research and professional practice.
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COURSE CONTENT / SYLLABUS

LAB-1	PRACTICAL Structural Geology and Geotectonics: Map Sections, Stereographic projection of the structural features etc.	30 hrs.
LAB-2	PRACTICAL Igneous Petrology and Metamorphic Petrology: Megascopic and microscopic rocks, Norms calculation.	30 hrs.
LAB-3	PRACTICAL Geomorphology and Landscape Evolution: Geomorphic Analysis using maps, toposheets and softwares, Landscape Evolutionary Models.	30 hrs.
LAB-4	PRACTICAL Advanced Mineralogy, Crystallography and Instrumentations: megascopic, microscopic minerals and elemental composition of minerals and rocks, Elements of Symmetry, Miller Indices, HM symbols, stereographic projections; identification of forms with models.	30 hrs.

REFERENCES

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DEPARTMENT OF GEOSCIENCES
FACULTY OF SCIENCE
KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
ACADEMIC YEAR- 2026-27



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Skill Enhancement Course (SEC): Field Techniques in Geology	Credits:	2
Semester:	I	Paper Code: SCGE-106	Hours:	60

Objectives: The course aims to develop students' practical competence in geological field methods through sustained outdoor training across igneous, sedimentary and metamorphic terrains. Students will learn systematic data collection, representative sampling, and geological photographic techniques, and will gain hands-on experience in geomorphological, structural and stratigraphic mapping including fossil-bearing successions. Instruction covers field analysis of engineering-relevant rock and soil conditions, basic aspects of mining geology, and documentation of geoheritage sites. Emphasis on field record-keeping, sample labelling, safety and ethical practices will prepare students to produce clear field reports, integrate field and laboratory data, and apply field techniques to research, exploration and applied geoscience problems.

COURSE CONTENT / SYLLABUS

SEC	PRACTICAL	60 hrs.
	Outdoor practical in Igneous, Sedimentary and Metamorphic terrains. Data Collection, Sampling and Photographic Techniques in Geological Field. Geomorphological and Structural Mapping and analyses. Studies of stratigraphic successions and fossil record. Studies of engineering structures with reference to geosciences. Understanding aspects of mining geology, Studies of Geoheritage sites etc.	

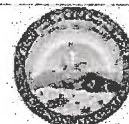
REFERENCES

1. Angela L. Coe: Geological Field Techniques.
2. S.M. Mathur: Guide to Field Geology.
3. Compton, R. R., & Compton, R. R. (1985). Geology in the Field (p. 416). New York: Wiley.
4. Field Geology, Frederic Henry Lahee, Publisher McGraw-Hill Book Company, 1961.





**DEPARTMENT OF GEOSCIENCES
FACULTY OF SCIENCE
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ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Major Paper- 1: Principal of Stratigraphy, Sedimentology and Advanced Paleontology	Credits:	4
Semester:	II	Paper Code: MJGE-201	Hours:	60

Objectives: The course aims to provide students with a comprehensive foundation in stratigraphy, sedimentology and advanced paleontology, linking stratigraphic principles and global events to methods of stratigraphic analysis (litho-, chrono-, bio-, sequence-, magneto- and seismo-stratigraphy). Students will learn to describe, quantify and interpret sedimentary particles, textures, structures and facies, and to reconstruct depositional processes, paleoenvironments and basin evolution using sedimentological and provenance indicators. Emphasis on fossil preservation, taxonomy, taphonomy and paleoecology will train students to use macrofossils, microfossils, trace fossils and palaeobotanical evidence for biostratigraphic correlation, palaeobiogeographic reconstruction and environmental interpretation. Fieldwork in stratigraphically and paleontologically significant terrains will develop practical skills in stratigraphic logging, paleocurrent analysis, sample collection and fossil documentation, enabling students to integrate field observations with laboratory data to address problems in basin analysis, resource exploration and Earth-history investigations.

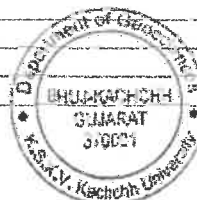
COURSE CONTENT / SYLLABUS

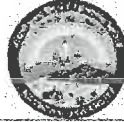
UNIT-1	THEORY Introduction to stratigraphy, Principles of Stratigraphic; Major global geological/stratigraphical events (viz. Glaciation, deglaciation, mass extinction, stromatolites, snow ball earth); Various techniques adopted for Stratigraphical analysis: Lithostratigraphy and Chronostratigraphy, Biostratigraphy, Sequence Stratigraphy, Magnetostratigraphy and Seismo-stratigraphy.	15 hrs.
UNIT-2	THEORY Introduction to Sedimentology; Kinds of sedimentary particles; sedimentary texture shape, size, fabric and surface textures, methods of textural analysis, textural parameters and their significance; Rocks of mechanical origin, Gravels, Rudaceous sedimentary rocks (Conglomerates & Breccias); Sands & Sandstones; Shales, Argillites & Siltstones; Rocks of chemical and biochemical origin: Limestones & Dolomites; Hydraulics, sediment transportation and structures; Liberation and flux of sediments, processes of transport and generation of sedimentary structures; Paleocurrent analysis: Paleocurrent indicators; Sedimentary Provenance indicator. Sedimentary environments and facies; Classification of environments; Physical and chemical parameters of depositional environments; Structures and vertical sequences formed in alluvial, deltaic, coastal, deep sea, Aeolian & carbonate environments, Evolution and types of Sedimentary basins.	15 hrs.
UNIT-3	THEORY Fossils; Preservation and fossil record; Taxonomy and taphonomy; Species concept; Principles of Paleocology and Paleobiogeography; Morphology, classification and geological distribution of invertebrates (Trilobites, bivalves, brachiopods, gastropods, echinoids, ammonites, graptolite, belemnite, coral).	15 hrs.
UNIT-4	THEORY Classification of Vetebrate animal kingdom; Morphology, classification and geological distribution of vertebrates; Evolutionary history of horse, camel, elephant and primates; Evidences from fossil record, major structural and physiological changes in vertebrates in India. Classification and environmental significance of trace fossils, Animal sediment relationship using ichnofacies. Microfossils (foraminifera, ostracoda, conodonts, bryozoa); Paleobotany (plant, spores, pollens).	15 hrs.

Field Details: Field Visit to Stratigraphic significant sites, diverse sedimentary terrain and paleontological important sites

REFERENCES

1.	Sam Boggs, 1995. Principles of Sedimentology and Stratigraphy, Print iceHall, New Jersey.
2.	Nichols, G., 1999. Sedimentology and Stratigraphy, Blackwell publishing.
3.	Sengupta, S. (2017). Introduction to sedimentology. Routledge.
4.	Pettijohn, F.J., 1975. Sedimentary Rocks, Harper and Row Publ. New Delhi.
5.	Tucker, M.E., 2006. Sedimentary Petrology. Blackwell Publishing.
6.	Blatt, H., Middleton, G.V. and Murray, R.C. (1980): Origin of Sedimentary Rocks, Prentice Hall Inc.
7.	Amal Das Gupta. Paleontology.
8.	Clarkson, E.N.K. Invertebrate Paleontology and Evolution, ELBS. 1987.
9.	P.C. Jain. Paleontology (Paleobiology) Evolution and animal distribution.
10.	Benton, J.B. Vertebrate Paleontology, Chapman & Hall, 1997.
11.	Shrock and Twenhofells, Invertebrate Paleontology, CBS publishers.



		DEPARTMENT OF GEOSCIENCES FACULTY OF SCIENCE KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY ACADEMIC YEAR- 2026-27			
Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)					
Year:	1	Major Paper- 2: Geology of India with special emphasis on Gujarat		Credits:	4
Semester:	II	Paper Code: MJGE-202		Hours:	60
Objectives:	The course aims to provide students with a detailed understanding of the geological evolution of India with focused study of Gujarat, integrating regional tectonics, stratigraphy, paleontology and resource distribution. Students will learn the tectonic framework and major crustal divisions of India, including cratons and mobile belts, and will apply stratigraphic principles to Proterozoic and Phanerozoic basins. Emphasis on Gujarat covers the physiography, structure, tectonics, stratigraphy, geomorphology, seismicity, fossil record and mineral resources of Mainland Gujarat, Saurashtra and Kutch, enabling students to relate local geology to regional and national geodynamic processes. Field visits to representative terrains across Gujarat and India will develop practical skills in geological mapping, stratigraphic logging, structural interpretation and resource documentation, preparing students to use regional geological knowledge in basin analysis, exploration, seismic hazard assessment and applied geological investigations.				
COURSE CONTENT / SYLLABUS					
UNIT-1	THEORY	Tectonic Framework of India; Tectonic divisions, Cratons (Dharwar, Aravalli, Singhbhum), Mobile belts (Eastern Ghat, Satpura and Precambrian of Himalaya), Proterozoic Sedimentary basins: Paleoproterozoic (Bijawar, Gwalior, Papaghni Sub basin) and Mesoproterozoic Basins (Vindhyan, Parinatha Godavari, Cuddapah).			15 hrs.
UNIT-2	THEORY	Phanerozoic Stratigraphic of India (Paleozoic, Mesozoic and Tertiary).			15 hrs.
UNIT-3	THEORY	Physiographic division of Gujarat; Structure, tectonics, stratigraphy and geomorphology of Mainland Gujarat, Mineral resources of Mainland Gujarat; Seismicity of Mainland Gujarat; Fossil records of Mainland Gujarat.			15 hrs.
UNIT-4	THEORY	Structure, tectonics, stratigraphy and geomorphology of Saurashtra and Kutch; Mineral resources of Saurashtra and Kutch; Seismicity of Saurashtra and Kutch; Fossil records of Saurashtra and Kutch.			15 hrs.
Field Details: Field Visit to Various Geological Terrains of Gujarat and India.					
REFERENCES					
1.	M. Ramakrishnana and R. Vaidyanathan: Geology of India (Vol. 1 & 2), (GSI), Bangalore.				
2.	Valdiya, K.S., The making of India Geodynamic Evolution. MacMillan, 2010.				
3.	Ravindra Kumar: Fundamentals of Historical Geology and Stratigraphy of India. 2010				
4.	Krishnan, M. S., Geology of India and Burma, CBS Publisher, 2006.				
5.	Sharma, R. (2009). Cratons and fold belts of India (Vol. 127). Springer.				
6.	S. S. Merh. Geology of Gujarat.				
7.	Biswas, S. K., Mahender, K., & Chauhan, G. D. (2022). Field Guide Book of Geology of Kutch (Kachchh) Basin, Gujarat, India. Springer.				
8.	BISWAS, S. K. 1993. Geology of Kutch. KDM Institute of Petroleum Exploration, Dehradune, 450 pp.				





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ACADEMIC YEAR- 2026-27



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Major Paper- 3: Geochemistry and Isotope Geology	Credits:	4
Semester:	II	Paper Code: MJGE-203	Hours:	60

Objectives:	The course is designed to give students a solid grounding in chemical principles that control Earth materials and processes, combining elemental and isotopic perspectives. Students will learn elemental distribution and behavior (including trace elements, REE and PGE) in the Earth-solar system context and apply geochemical classification and distribution-coefficient concepts to lithosphere, hydrosphere and atmosphere. The programme introduces nuclear physics relevant to geochronology and trains students in radiogenic dating methods (Rb-Sr, Sm-Nd, U-Pb, Pb-Pb, K-Ar and allied techniques such as C-14, TL and OSL), enabling interpretation of age data for rocks, minerals and sediments. Instruction on geochemical systematics, thermodynamics (entropy, enthalpy, Gibbs free energy) and open/closed-system behavior develops students' ability to model element mobility and equilibria. Coverage of stable-isotope theory and fractionation (O, C, H) prepares students to use isotopic proxies for palaeoclimate, provenance and fluid-process studies. An academic visit to a geochemical/chronology laboratory or industry will consolidate theoretical learning with exposure to analytical instrumentation and real-world data interpretation.
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COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Fundamental concept of Geochemistry; Atomic structures and properties of elements in the Periodic Table; Origin and abundance of elements in the solar system and in the Earth and its constituents; Geochemical behavior of Trace, Rare Earth Elements (REE) and PGE; Cosmic abundance of elements.	15 hrs.
UNIT-2	THEORY Composition of Planets; Meteorites: their classification, mineralogy, and origin: Crust, Mantle, and Core composition of Earth; Geochemistry of hydrosphere, lithosphere and atmosphere; Geochemical classification of elements; Concept of distribution coefficient.	15 hrs.
UNIT-3	THEORY Introduction and physics of nucleus; Radioactive decay, law of radioactivity and half-life period; Types of Radioactive decay; Geochemistry of Radioactive Isotopes: Rb, Sr, K, Ar, Sm, Nd, U, Th, Pb; Radiogenic Isotope Geochronometers: Sm-Nd method, Rb-Sr method, U-Pb, Th-Pb, Pb-Pb method. Carbon, Thermoluminescence and OSL dating method.	15 hrs.
UNIT-4	THEORY Geochemical systems: Open, closed, isolated; Concept of equilibrium, Entropy, enthalpy, Gibbs free energy, and laws of thermodynamics; Stable Isotopes: nature, abundance and fractionation; Stable isotopes of oxygen, carbon and hydrogen; Isotope fractionation and its applications for Paleoclimate.	15 hrs.

Academic Visit: Academic Visit to geochemical and geochronological institute/industries.

REFERENCES

1. Mason, B. Principles of Geochemistry, Wiley Eastern, 1982.
2. Faure, G. Inorganic Geochemistry, Prentice Hall, 1991.
3. William M. White. Geochemistry. Wiley, 2013.
4. Krauskopf, K.B. Introduction to Geochemistry, Mc Graw Hill, 1994.
5. Aswathnarayana, U. Principles of Nuclear Geology, Oxford Press, 1985.





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ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Major Paper- 4: Quaternary Geology and Geoarchaeology	Credits:	4
Semester:	II	Paper Code: MJGE-204	Hours:	60

Objectives:	The course is designed to provide students with a comprehensive grounding in the geological, climatic, and tectonic processes that shaped the Earth during the Quaternary Period, while integrating an interdisciplinary geoarchaeological perspective. Students will learn the fundamental characteristics of Quaternary stratigraphy, global climatic fluctuations (glacial-interglacial cycles), and the mechanisms driving eustatic and relative sea-level variations, with special reference to the Indian coastline. The programme introduces the principles of landscape evolution, training students to analyze how geomorphic systems respond to climate and tectonics, and utilizing geomorphic markers and neotectonic indices to identify active landform changes. Instruction on paleoseismology equips students with field techniques to map prehistoric landforms, recognize co-seismic event horizons, and evaluate earthquake recurrence intervals across diverse tectonic settings. Additionally, coverage of advanced geochronological techniques—including Radiocarbon, Uranium-series, Luminescence (TL/OSL), and Amino Acid dating—enables precise chronological framing of ancient materials and sediments. The course bridges Earth sciences and anthropology by introducing geoarchaeology, detailing the stages of prehistoric cultural evolution, early human settlements, and the salient features of the Indus Valley Civilization. Through the synthesis of multi-proxy data and stratigraphic sequences, students will learn to execute paleoenvironmental reconstructions. Field visits to geomorphologically, seismically, and archaeologically significant sites will consolidate theoretical learning with real-world spatial observations and data interpretation.
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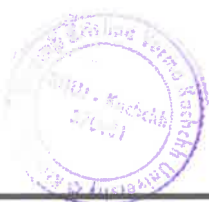
COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Nature and major characteristics of Quaternary Period; Quaternary Stratigraphy; Quaternary climatic changes-glacial and interglacial periods; Sea level changes – Eustatic Sea Level (ESL), Relative Sea Level (RSL), glacio-eustasy, tectono-eustasy; Sea level changes during Quaternary with special reference to India.	15 hrs.
UNIT-2	THEORY Application of various proxy indicators for paleoenvironmental/ paleoclimatic studies. Responses of geomorphic systems to climate, sea level and tectonics on variable time scales in the Quaternary. Neotectonics and active tectonics for changes in landforms geomorphology; Geomorphic markers/ indices, Quaternary dating methods: Radiocarbon, Uranium series, Luminescence, Amino acid, relative dating methods.	15 hrs.
UNIT-3	THEORY Paleoseismology: Introduction to paleoseismology, prehistoric earthquakes and dating, recurrence and dating, Co-seismic event horizon, co-seismic uplift, Field techniques in paleoseismology, mapping paleoseismic landforms, prehistoric stratigraphy. Paleoseismology of extensional and compressional/ subduction zone tectonic environments.	15 hrs.
UNIT-4	THEORY Introduction to Geoarchaeology: Definition, scope and its history; Stages of prehistoric cultural evolution—Palaeolithic, Mesolithic, Neolithic, and Chalcolithic; Early human settlements in the Indian subcontinent; Origin, extent, and salient features of the Indus Valley Civilization and post-Harrappan developments; Role of geology in archaeological research and vice versa; Methods for identifying and interpreting stratigraphic sequences; Paleoenvironmental reconstruction, proxy data and their interpretation: important case studies of paleoenvironmental reconstruction in archaeology; Dating Geoarchaeological Material.	15 hrs.

Field Details: Field Visits to geomorphologically, Quaternary and geoarchaeologically important sites.

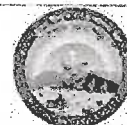
REFERENCES

1.	Bradley, R.S. Paleoclimatology: Reconstructing Climates of the Quaternary.
2.	Cronin, T.M. Paleoclimates: Understanding Climate Change Past and Present.
3.	Bull W. D. (1991) Geomorphic Responses to Climatic Change, Oxford Uni. Press New York.
4.	Keller E. A. (1986) Active Tectonics National Academic Press, New York.
5.	Lowe, J.J. & Walker, M.J.C. Reconstructing Quaternary Environments, Longman (1984).
6.	Christopher L. Hill, Jr. Rapp, George: Geoarchaeology: The Earth-Science Approach to Archaeological Interpretation (2006).
7.	N. Tiwari; V. Singh; S. B. Mehra: Quaternary Geoarchaeology of India, 2023.
8.	Allchin, B. & Allchin, R. The Rise of Civilization in India and Pakistan.
9.	Coningham, R. & Young, R. The Archaeology of South Asia: From the Indus to Asoka, c. 6500 BCE–200 CE.
10.	Maher, B.A. & Thompson, R. Quaternary Climates, Environments and Magnetism.
11.	James P. McCalpin (2009), Paleoseismology, Academic Press.
12.	Bull and Mc Fadden, Tectonic Geomorphology.





DEPARTMENT OF GEOSCIENCES
FACULTY OF SCIENCE
KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
ACADEMIC YEAR- 2026-27



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	1	Major Paper- 5: Combined Practical	Credits:	4
Semester:	II	Paper Code: MJGE-205	Hours:	120

Objectives:	The course is designed to provide students with hands-on laboratory and analytical skills, bridging theoretical concepts with empirical datasets across the key sub-disciplines of geosciences. Students will develop practical expertise in the principles of stratigraphy, sedimentology, and advanced paleontology by conducting thin-section petrography, performing grain-size sieve analysis to interpret depositional environments, and executing stratigraphic reconstructions. The programme trains students in taxonomic fossil identification, micropaleontology, and the analysis of ichnofacies to infer paleoecological conditions. Specialized practical exercises on the Geology of India, with a dedicated focus on the geological framework of Gujarat, will enable students to interpret complex regional maps and construct precise lithostratigraphic columns. Additionally, instruction in geochemistry and isotope geology will equip students with quantitative skills to calculate atomic weight percentages and model radionuclide decay pathways for major geochronological systems, including Potassium-Argon (K-Ar), Rubidium-Strontium (Rb-Sr), and Samarium-Neodymium (Sm-Nd). Finally, coverage of Quaternary geology and geoarchaeology will train students to integrate Remote Sensing (RS) and Geographic Information Systems (GIS) to generate geomorphological maps, perform quantitative drainage morphometric analyses, and systematically examine and categorize geoarchaeological artifacts. By synthesizing data across these four laboratory components, students will cultivate the rigorous technical competency required for advanced research, field investigations, and industrial applications.
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COURSE CONTENT / SYLLABUS

LAB-1	PRACTICAL Principal of Stratigraphy, Sedimentology and Advanced Paleontology: Petrography, Grain size analysis, sieving for sedimentary environment, Stratigraphic Reconstruction, fossils identification, micropalaeontology, ichnofacies.	30 hrs.
LAB-2	PRACTICAL Geology of India with special emphasis on Gujarat: Maps, Stratigraphic Reconstructions.	30 hrs.
LAB-3	PRACTICAL Geochemistry and Isotope Geology: Calculation of Atomic Wt. %, Isotopes, K-Ar, Rb-Sr, Sm-Nd Radionuclide Decay.	30 hrs.
LAB-4	PRACTICAL Quaternary Geology and Geoarchaeology: Preparation of Geomorphological maps through RS and GIS, Morphometric Analysis etc., Geoarchaeological Artifacts Studies.	30 hrs.

REFERENCES

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		DEPARTMENT OF GEOSCIENCES FACULTY OF SCIENCE KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY ACADEMIC YEAR- 2026-27			
Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)					
Year:	1	Skill Enhancement Course (SEC): Remote Sensing and GIS Paper Code: SCGE-206		Credits:	2
Semester:	II			Hours:	45
Objectives:	The course is designed to equip students with a robust foundation in the principles and workflows of geospatial technologies, focusing on their direct applications to geological and geomorphological investigations. In the theoretical module, students will learn the physics of electromagnetic radiation, data acquisition systems, and the geometric properties of aerial photography alongside digital photogrammetry. The curriculum covers satellite remote sensing, visual image interpretation, and digital image processing—including image enhancement and classification—to extract topographic and active tectonic structural features. Concurrently, instructions in Geographical Information Systems (GIS) introduce hardware architectures, database structures, spatial data models (raster and vector data formats), and continuous versus discrete data types. The practical component of the programme provides rigorous hands-on technical training using open-source QGIS software, covering core data preparation workflows such as georeferencing, digitization of thematic layers, and the integration of Global Positioning System (GPS) field data. Students will develop specialized analytical skills in basic photogrammetry, parallax height measurements, and digital elevation model (DEM) based terrain characterization to construct drainage patterns, count contours, analyze linear/planar elements, and map land use/land cover. Ultimately, coverage of advanced overlay analysis and automated watershed modeling prepares students to tackle real-world environmental challenges, resource exploration, and academic research in regional geosciences.				
COURSE CONTENT / SYLLABUS					
SEC	THEORY	Remote Sensing: Introduction and Principles of Remote Sensing, Aerial Photographs and their Geometry, Photogrammetry, Satellite Remote Sensing, Image Interpretation and Digital image processing, and Image Enhancement, Image classification, Interpretation of topographic and tectonic features. GIS: Principles and applications of Geographical Information System, GIS hardware components and GIS roles, Geographic data and database- spatial data, types of GIS database and discrete and continues data, Raster and vector data, Application of GIS in Geosciences.			15 hrs.
	PRACTICAL	Laboratory exercise for remote sensing and Photogeology, satellite imagery interpretation for geological and geomorphological applications, Basic photogrammetry exercises like parallax measurements for height, Hands on training on QGIS- Georeferencing, Contour, Drainage, DEM-based terrain analysis, Areal, Planer and linear Features, overlay analysis, Field and Object Based Model, Digitization of thematic layers, Watershed analysis, GPS integration, Land use/land cover mapping.			30 hrs.
REFERENCES					
1.		Lillesand, T.M. and Kiefer, R.W. Remote sensing and Image Interpretation, John Wiley, 1987.			
2.		S. A. Druary, Image Interpretation in Geology.			
3.		Gupta, R. P. Remote Sensing Geology. Springer, 1990.			
4.		Bhatta, B. (2008). Remote sensing and GIS (Vol. 2). New Delhi: Oxford University Press.			
5.		Curran, P. J. (1988) Principles of remote sensing.			
6.		Leuder, D. R. Aerial photographic interpretation: Principles and Interpretation.			



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**DEPARTMENT OF GEOSCIENCES
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KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Major Paper- 1: Oceanography, Climatolgy and Planetary science	Credits:	4
Semester:	III	Paper Code: MJGE-301	Hours:	60

Objectives:	The course is designed to provide students with an advanced, integrated understanding of Earth's fluid envelopes and its broader solar system context, blending oceanic, atmospheric, and planetary sciences. In the oceanography component, students will learn the morphological and tectonic evolution of ocean basins, surface and deep-ocean thermohaline circulations, and major water masses, alongside modern climatic ocean-atmosphere phenomena such as El Niño and the Indian Ocean Dipole. The curriculum explores the chemical and physical factors governing ocean salinity and sediment distribution to reconstruct paleoceanographic environments. Instruction in climatolgy details the Earth's atmospheric vertical structure, radiation balance, solar constant variables, and atmospheric scattering mechanisms, as well as the seasonal dynamics of global wind belts, monsoon systems, jet streams, and extreme weather systems like cyclones. Students will develop skills in weather data analysis, forecasting instrumentation, and climatic categorization using the Köppen and Thornthwaite classification schemes. Furthermore, coverage of planetary science introduces the comparative geology, surface processes, and geophysics of rocky bodies and small celestial masses using planetary remote sensing. By examining cosmic impacts, meteoritic influxes, and planetary evolution, the programme prepares students to analyze extra-terrestrial factors that have historically driven major climate shifts and mass extinction events on Earth. Academic field visits to national oceanic, meteorological, and planetary analog research institutes will consolidate theoretical knowledge with cutting-edge analytical observations.
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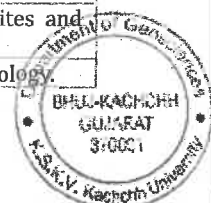
COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Morphology and tectonic domains of the ocean floor and various topographical features; Oceanic circulations, waves and currents, El Niño, Indian Ocean Dipole; Wind and ocean circulation and their controlling factors; downwelling and upwelling; surface and deep ocean circulation; Thermohaline circulation; major water masses of the world's oceans; salinity—causes, controlling factors, and its effects on the properties of ocean water; Oceanic sediments: Factors controlling the deposition and distribution of oceanic sediments; Tectonic evolution of the ocean basins.	15 hrs.
UNIT-2	THEORY Fundamental of climatolgy; Earth's radiation balance; Solar constant, effect of clouds, surface and planetary albedo; Rayleigh and Mie scattering, multiple scattering; vertical thermal structure and composition of the atmosphere; Latitudinal and seasonal variation of insolation; Temperature, pressure, wind belts, humidity, cloud formation and precipitation, water balance.	15 hrs.
UNIT-3	THEORY Air masses, air circulation, monsoon, Jet streams, tropical cyclones and anticyclones; Classification of climates Köppen's and Thornthwaite's scheme of classification; Weather Data Analysis and Forecasting General measurement System.	15 hrs.
UNIT-4	THEORY Solar System and Planets: Origin of the solar system, Classification of planets, Earth in the solar system, Small bodies, Planetary Surfaces and Geology, Planetary Surfaces and Geology: Surface processes on rocky bodies, Planetary landforms, Remote sensing of planetary surfaces, Introduction to planetary geophysics, Extra-terrestrial Aspects relevant to Earth Scientists: Cosmic and meteoritic contributions to Earth's crust and mantle, Role of impacts in mass extinctions and climate change, Astrogeology and planetary evolution.	15 hrs.

Field Details: Academic Visits to Institutes pertaining to Oceanic, Climate and Meteorological Science and Field Visits to Planetary Science Analog Sites, Academic Visits to the Planetary Institutes/ Industries.

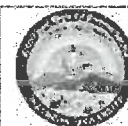
REFERENCES

1.	Kennett, J.P. (1982) Marine Geology. Prentice Hall.
2.	D.S. Lal Climatolgy and Oceanography.
3.	Pinet, P. R. (1992). Oceanography: An introduction to the planet Oceanus (2nd ed.). West Publishing Company.
4.	C. Donald Ahrens (2014) Essentials of Meteorology: An Invitation to the Atmosphere. Cengage.
5.	Louis J. Battan (1984) Fundamentals of meteorology. Prentice Hall.
6.	Holton, J. R., & Hakim, G. J. (2012). An introduction to dynamic meteorology (5th ed.). Academic Press.
7.	Emiliani, C. - Planet Earth: Cosmology, Geology and the Evolution of Life and the Environment – good for “Earth system” and planetary-science context.
8.	Kerr, R.A. - Asteroids, Comets, and Meteors (or similar planetary-science monographs) – for meteorites and small-body geology.
9.	Turcotte, D. & Schubert, G. - Geodynamics – for planetary-scale mantle convection and comparative planetology.





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KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
ACADEMIC YEAR- 2026-27



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Major Paper- 2: Geophysics, Seismology, Geodesy and Engineering Geology	Credits:	4
Semester:	III	Paper Code: MJGE-302	Hours:	60

Objectives:	The course is designed to provide students with a solid grounding in the physical principles, data reduction workflows, and engineering applications that govern the detection, mapping, and modification of Earth materials and subsurface structures. Students will learn the fundamental methodologies of geophysical exploration, mastering gravity data reductions, magnetic anomaly corrections for point poles and dipoles, electrical resistivity profiling and sounding (utilizing Wenner and Schlumberger arrays), and the math-physical parameters of two-layered reflection and refraction seismic problems alongside ground-penetrating radar (GPR) systems. The programme introduces earthquake seismology and the physical properties of the Earth's interior, training students in short-period, long-period, and strong-motion seismometry. Instruction on seismic sources—including the double-couple hypothesis, focal mechanisms, and fault plane solutions—develops students' ability to evaluate regional seismotectonics, reservoir-induced events, and seismic hazards via travel-time residuals and seismic tomography. Coverage of physical, mathematical, and satellite geodesy prepares students to interpret geodetic datums, coordinate systems, and maps while evaluating global concepts of isostasy, eustasy, and geomagnetism. Furthermore, the course delivers critical geotechnic workflows by exploring the physico-mechanical properties of rocks and soils, rock failure criteria (Mohr-Coulomb, Griffith, Hoek-Brown), and rock mass classification frameworks (RMR and Q-systems). Ultimately, students will develop the capacity to execute slope stability and landslide analyses, evaluate site conditions for civil structures like tunnels, dams, and foundations, and design site-improvement methods tailored for earthquake-prone zones. Academic visits to seismological research institutes and heavy engineering project sites will consolidate classroom learning with exposure to real-world instrumentation and field data interpretation.
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COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Introduction, Principles and Limitations of Geophysics; Basic principles of geophysical exploration; Gravity Method: geomagnetic field, secular variations and westward drift, geomagnetic storms, Stable and unstable gravimeters and their types, field procedure and reduction gravity of data. Magnetic Method: Principles and applications, Types of magnetometers. Anomalies due to point pole and dipole, field practices and corrections. Electrical Method: Elements of SP, IP and resistivity methods, Wenner and Schlumberger configurations. Methods of resistivity profiling and sounding, theory of images; Elementary principle of seismic Method - reflection and refraction methods, two layered reflection and refraction problems including inclined layer; Difference between refraction and reflection surveys. Basic principles of electromagnetic; Ground penetrating Radar (GPR) studies.	15 hrs.
UNIT-2	THEORY Basic concepts of seismology and internal structure of the Earth. Physico-chemical and seismic properties of Earth's interior. Seismometry: short period, long period, broad band and strong motion; elements of earthquake seismology; seismic sources: faulting source, double couple hypothesis, seismic moment tensor, focal mechanism and fault plane solutions; seismic gaps; seismotectonics and structure of the earth; Himalayan and stable continental region earthquakes, reservoir induced seismicity; seismic hazards; earthquake prediction, travel time residuals, velocity anomalies, seismic tomography.	15 hrs.
UNIT-3	THEORY Principles and techniques in Geodesy; Physical and mathematical Geodesy; Satellite Geodesy, Datum, coordinate system, geodetic instrumentation; Principles of gravity of the earth; Isostasy and Eustasy; Geomagnetism and magnetism of the earth; Geodetic mapping of Earth's surface.	15 hrs.
UNIT-4	THEORY Physico-mechanical properties of rocks and soils; rock index tests; Rock failure criteria (Mohr-Coulomb, Griffith and Hoek-Brown criteria); Shear strength of rock discontinuities; Rock mass classifications (RMR and Q Systems); Different methods of Soil testing; In-situ stresses; Analysis of slope stability; Landslides: classification and analysis; Role of geology in civil construction, in planning, location, design, construction and performance of major civil engineering structures; Site improvement: drainage/dewatering, flattening/resloping, soil nailing, rock bolting, stone columns, micropiles, geosynthetics, retaining walls, grouting, bioengineering, erosion/rockfall protection; Tunnels, Buildings: Site Exploration and Foundation; Bridges and Pavements; Dams and Reservoirs; Structures in earthquake prone regions, rocks as construction materials.	15 hrs.

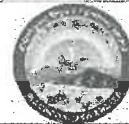


Field Details: Academic Visits to the Seismological and Geophysical Institutes/ Industries, Engineering Geological Sites.

REFERENCES

1. Lowrie, W. (2007) Fundamentals of Geophysics, Cambridge.
2. Mussett, A. E. & Khan, M.A., (2000) Looking into the Earth: An introduction to Geological Geophysics. Cambridge.
3. Dobrin, M. B., & Savit, C. H. (1960). Introduction to geophysical prospecting (Vol. 4). New York: McGraw-hill.
4. Bristow, C.S. & Jol, H.M. (2003) Ground Penetration Radar in Sediments. Geol. Soc. of America sp. Publication.
5. James Howard Gore. Elements of Geodesy.
6. William M. Kaula. Theory of Satellite Geodesy (Application of satellites to Geodesy).
7. Van Nostrand, R., & Cook, K. L. (1966). Interpretation of resistivity data (Vol. 499). US Government Printing Office.
8. Keller, G. V., & Frischknecht, F. C. (1966). Electrical methods in geophysical prospecting.
9. Lowrie, W. - Fundamentals of Geophysics – clear, CSIR-NET-friendly chapters on seismology and gravity-magnetism.
10. Kearey, P., Brooks, M., & Hill, I. - An Introduction to Geophysical Exploration – practical and exam-oriented for seismic-survey concepts.
11. Shearer, P. - Introduction to Seismology – more advanced but excellent for a compact M.Sc. seismology module.
12. Surendra Kumar - Joint CSIR-UGC-NET Earth Science – topic-wise practice and theory framing for Part B and C.
13. Ahmad, S. - An Objective Earth Science (for CSIR, NET, JRF, IAS) – MCQ-style coverage of seismology, geophysics, and Planetary Science topics.
14. D. P. Kryniene & W. R. Judd. Principles of Engineering Geology and Geotechnics. McGraw Hill, NY. 1998.
15. Bell F G (1983) Fundamentals of engineering geology; Butterworths, London.
16. Subinoy Gangopadhyay. Engineering Geology. Oxford University Press. 2012.
17. Kramer, S. L., & Stewart, J. P. (2024). Geotechnical earthquake engineering. CRC Press.

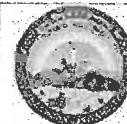


		DEPARTMENT OF GEOSCIENCES FACULTY OF SCIENCE KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY ACADEMIC YEAR- 2026-27			
Master of Science In Geology: Regular (NEP-2020) (2 Year Programme)					
Year:	2	Major Paper- 3: Environmental Geology and Disaster Management		Credits:	4
Semester:	III	Paper Code: MJGE-303		Hours:	60
Objectives:	The course is designed to provide students with an advanced understanding of earth system dynamics at the interface of human societies, environmental change, and disaster risk reduction, combining geological realities with strategic management frameworks. Students will learn the fundamental concepts of environmental geology, evaluating the origins and dynamics of natural processes—such as volcanism, earthquakes, landslides, and flooding—alongside human-induced catastrophes including nuclear incidents, transportation accidents, and deforestation. The programme introduces industrial waste processing strategies (covering solid, liquid, and radioactive materials), the geological implications of rapid urbanization, and the ecological footprints left by mineral and fossil fuel exploitation. Instruction on dryland ecosystems details the causes, monitoring, and engineering mitigations for desertification within the Indian subcontinent, while exploring remediation mechanisms for soil, air, and ground water pollution, including trace-element toxicity and its effects on medical geology and public health. Furthermore, coverage of disaster management theories equips students with the quantitative skills to assess hazard risk, socioeconomic vulnerability, and community coping capacities, with dedicated focus on coastal development issues and vulnerable populations. Ultimately, the curriculum prepares students to navigate emergency response architectures, from early forecasting systems, reconstruction, and disaster psychology to institutional frameworks. Students will gain comprehensive insight into the roles played by first responders, spontaneous volunteers, and prominent statutory organizations such as the NDMA, NIDM, GIDM, NDRE, and SDRF, as dictated by the National Disaster Management Act and Policy. Academic field exposures to highly vulnerable sites and leading emergency management institutes will consolidate classroom knowledge with practical risk-reduction and resilience planning.				
COURSE CONTENT / SYLLABUS					
UNIT-1	THEORY	Environmental Geology: Concepts of Environmental Geology, Geologic and Natural Hazards and hostile environment: Volcanism, earthquakes, landslide and mass movements, floods. Man made disasters with case studies- nuclear disaster, building fire, forest fire, deforestation and transportation accidents. Waste management: Solid, liquid and radioactive, Geology and urbanization, Mineral and Energy Resources: Impact of their exploitation on the environment. Mineral resources and future of mankind.			15 hrs.
UNIT-2	THEORY	Desertification- causes and extent, drylands of the Indian subcontinent. Mitigation measures of desertification. Soil pollution: Sources, effects and remediation. Water Pollution, Ground water pollution, trace elements and health. Air pollution. Water resource exploration and environmental impact, Land use planning and land use impact. Environmental Problems related to Geology: Indian Perspective.			15 hrs.
UNIT-3	THEORY	Disaster: Introduction to disasters, Coastal development and Disaster, Increasing frequency of disaster and their reversal, Debris disposal and Recycling from disaster. Disaster Management: Introduction to Disaster Management, Hazard risk, Vulnerability, Coping Capacity, Emergencies and related terms. Natural and human induced disasters. Disaster vulnerability in India. Risk – Assessment, management and disaster mitigation, Disaster Management and population with special needs.			15 hrs.
UNIT-4	THEORY	Disaster preparedness and Response: Forecasting system. Reconstruction and Rehabilitation. Disaster Psychology: A Dual perspective, Managing the spontaneous volunteer, First responder and workforce protection, The role of coordination in Disaster Management. Legislation and government role in disaster risk reduction: National Disaster Management Act and Policy, National agenda on disaster risk reduction (DRR), NDMA, NIDM, GIDM, NGO's community-based disaster management, NDRE, SDRF. The role of training in disaster management.			15 hrs.
Field Details: Field Visits related to Disaster Vulnerable Sites, Academic Visits to the relevant institutes.					
REFERENCES					
1. Valdiya, K.S. (1987) Environmental Geology – Indian Context. Tata McGraw Hill.					
2. Keller, E.A. (1978) Environmental Geology, Bell and Howell, USA.					
3. Subramaniam, V. (2001) Textbook in Environmental Science, Narosa International.					
4. Bell, F.G. (1999) Geological Hazards, Routledge, London.					
5. Bryant, E. (1985) Natural Hazards, Cambridge University Press.					
6. Shrivastva, P.K., Singh, S.K., Mohanty, U.C., and Murty, T. (2020) Techniques for disaster risk management and mitigation Wiley.					
7. Government of India (2011) Disaster Management in India. Delhi, India: Ministry of Home Affairs.					
8. Harsh Gupta (2003), Disaster Management, Universities Press.					
9. Thomas D. Schneid and Larry Collins (2001), Disaster management and preparedness: Occupational safety and health guide series, CRC Press.					





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ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Major Paper- 4: Fuel Geology	Credits:	4
Semester:	III	Paper Code: MJGE-304	Hours:	75

Objectives:	The course is designed to provide students with a comprehensive and advanced understanding of the geological principles, exploration strategies, and processing technologies related to Earth's energy resources, focusing on fossil fuels and nuclear materials. In the coal geology module, students will learn the biochemical and geochemical pathways of coalification, mastering the physical and chemical characterization of coal through organic petrology, maceral analysis, and the industrial applications of reflectance and fluorescence microscopy. The curriculum details the classification, ranking, grading, and major stratigraphic distribution of Indian coal fields, while introducing coal bed methane (CBM) as an essential unconventional petroleum system. Instruction in petroleum geology covers the genetic theories of hydrocarbon origin, the physical-chemical properties of crude oil and natural gas, and the depositional environments controlling source rock maturation. Students will develop a deep understanding of primary and secondary migration mechanisms, reservoir rock traits, and the structural, stratigraphic, and hydrodynamic trapping configurations necessary for commercial accumulation. Furthermore, coverage of oil and gas engineering equips students with the subsurface workflows of a development geologist, detailing geological, geophysical, and mud-logging exploration techniques alongside practical drilling operations, including rig selection, coring, casing, cementation, and the management of drilling fluids. Finally, the programme addresses atomic energy by exploring the mineralogy, natural occurrences, and radiological prospecting methods for uranium, thorium, and allied nuclear fuels within productive Indian horizons. Ultimately, students will evaluate the environmental footprints of radioactive fuel extraction and the operational dynamics of national nuclear power infrastructures, consolidated through mandatory field training at active mines, petroliferous basins, or specialized industrial energy institutes.
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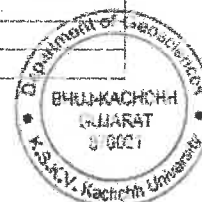
COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Coal formation; Types and stages of Coal; Classification, Ranks and Grading of coal; Physical and Chemical Characterization of Coal (Petrology) and its application; Application of reflectance and fluorescence study of coal; Major geological timescale and distribution of Coal in India; Methods of coal prospecting and production in India; Coal Bed Methane (CBM) – An unconventional petroleum system.	15 hrs.
UNIT-2	THEORY Petroleum: definition and its history; Theories of origin of Petroleum; Physical and chemical properties of petroleum and related substances; Environments and transformation processes involved for formation of hydrocarbons; Migration and Accumulation of Hydrocarbons; characteristics and types of Petroleum traps and Reservoir rocks.	15 hrs.
UNIT-3	THEORY Geological, geophysical and geochemical methods of petroleum exploration; Different methods of drilling; Coring; Drilling rigs; Drill holes; Casing and Cementation; Drilling fluids; Well completion; Functions of a Petroleum Geologist; Important oil & gas fields and petroleum prospects of India.	15 hrs.
UNIT-4	THEORY Atomic minerals as source of energy; Mode of occurrence and association of atomic minerals in nature; Methods of prospecting and productive geological horizons in India; Nuclear power stations of the country and future prospects, atomic fuels and Environment; Role of a Geologist in Atomic mineral exploration.	15 hrs.

Field Details: Field Visit to Coal Mines and Hydrocarbon prospective formations, Hydrocarbon Industries and Allied Research Institutes.

REFERENCES

1.	Chandra, D., Singh, R.M. Singh, M.P. (2000). Textbook of Coal (Indian context), Tara Book Agency, Varanasi.
2.	Thomas, L. (2013). Coal geology (2nd ed.). Wiley-Blackwell.
3.	Singh, M.P. (1998): Coal and organic Petrology, Hindustan Publishing Corporation, New Delhi.
4.	Selley, R. C., & Sonnenberg, S. A. (2022). Elements of petroleum geology (4th ed.). Academic Press.
5.	Bhagwan Sahay. (1994) Petroleum exploration and exploitation practices. Allied Pub.
6.	North F.K. (1985) Petroleum Geology.
7.	Singh, M.P. (1998): Coal and organic Petrology, Hindustan Publishing Corporation, New Delhi.
8.	Darling, T. (2005). Well logging and formation evaluation. Gulf Professional Publishing.
9.	Dahlkamp, F.J. (1993) Uranium Ore Deposits. Springer.
10.	Boyle, R.W. (1982). Geochemical Prospecting for Thorium and Uranium Deposits. Elsevier.





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ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Major Paper- 5: Combined Practical	Credits:	4
Semester:	III	Paper Code: MJGE-305	Hours:	120

Objectives:	The course is designed to provide students with advanced, hands-on laboratory expertise and field-data processing skills, reinforcing the theoretical components of oceanography, climatology, planetary science, geophysics, seismology, engineering geology, environmental management, and fuel geosciences. In the oceanography and climatology module, students will learn to analyze complex meteorological data, interpret paleoceanographic conditions from the microscopic and physical study of ocean sediments, and utilize specialized planetary maps and structural models to explore extraterrestrial landscapes. The programme trains students in the acquisition and numerical interpretation of geophysical and seismic survey data, alongside evaluating engineering geological site parameters through geotechnical analyses, soil-rock mechanics mapping, and tectonic map interpretations. Instruction on environmental geology and disaster management equips students with analytical protocols for chemical water and soil quality testing, while training them to construct hazard-risk vulnerability maps and simulate mitigation frameworks using interactive disaster management models. Finally, coverage of fuel geology provides practical training in the operation of bomb calorimeters to calculate the thermal efficiency and grade of coal and petroleum samples, combined with the structural interpretation of multi-channel seismic profiles and deep borehole data for subsurface reservoir and hydrocarbon zone identification. By integrating these four specialized laboratory tracks, the course prepares students to execute independent research projects and meet the technical requirements of national geoscientific industries.
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COURSE CONTENT / SYLLABUS

LAB-1	PRACTICAL Oceanography, Climatology and Planetary science: Analysis of Meteorological Data, Study of Ocean Sediments, Maps, Models.	30 hrs.
LAB-2	PRACTICAL Geophysics, Seismology, Geodesy and Engineering Geology: Geophysical Surveys, Geophysics and Seismic Data Interpretation, Seismic Surveys, Data Interpretation, Geotechnical Analysis, Maps.	30 hrs.
LAB-3	PRACTICAL Environmental Geology and Disaster Management: Maps, Disaster Management Models, Water and Soil testing, Maps.	30 hrs.
LAB-4	PRACTICAL Fuel Geology: Use of calorimeter for coal and petroleum, Interpretation of borehole and seismic data for the reservoir identification.	30 hrs.

REFERENCES

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ACADEMIC YEAR- 2026-27



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Skill Enhancement Course (SEC): Internship on Geosciences	Credits:	2
Semester:	III	Paper Code: SCGE-306	Hours:	60

Objectives:	The course is designed to provide students with professional exposure and industry-readiness by bridging advanced academic workflows with real-world workforce applications across the diverse sectors of geosciences. Through a mandatory experiential internship of at least 60 hours, students will gain firsthand training within national research institutes, academic organizations, state-of-the-art laboratory facilities, geological consultancies, or public and private industrial sectors. The programme intends to immerse students in the daily operational methodologies, project management schemes, and safety protocols executed by professional geologists, environmental scientists, and geotechnical engineers in applied, allied fields. By engaging with industry-standard instrumentation, participating in supervised fieldwork, and contributing to ongoing exploratory or environmental projects, students will learn to translate core geological theories into actionable solutions for commercial and societal challenges. Additionally, this corporate-academic interface trains students in critical professional skills—including advanced technical reporting, scientific data compilation, corporate communication, and ethical workplace conduct. Ultimately, the course aims to foster independent problem-solving capabilities, establish collaborative networks within the industrial and scientific communities, and clarify post-graduate career trajectories, culminating in a structured technical internship report and presentation based on their specialized professional engagement.
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COURSE CONTENT / SYLLABUS

SEC PRACTICAL

Internship of at least 60 hours at Research Institute, Academic Institute, Laboratories, Consultancy, Government Sectors, Private Sectors and Industry and Field Visit etc. pertaining to Geosciences (Allied Applied Fields) 60 hrs.

REFERENCES

1. The Geoscience Handbook: AGI Data Sheets by Douglas J. Walker and Harvey A. Cohen
2. Conquering Your Engineering Internship by John M. P. Knox
3. Advanced Objective Geology by Shilpa Saroj (Career-in-Action)

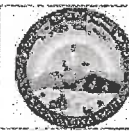


		DEPARTMENT OF GEOSCIENCES FACULTY OF SCIENCE KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY ACADEMIC YEAR- 2026-27			
Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)					
Year:	2	Major Paper- 1: Economic and Mining Geology		Credits:	4
Semester:	IV	Paper Code: MJGE-401		Hours:	60
Objectives:	The course is designed to provide students with a comprehensive and advanced understanding of the economic, tectonic, and engineering principles that govern the generation, distribution, and extraction of mineral resources. In the economic geology module, students will learn the fundamental definitions of industrial mining economic metrics, including ore, gangue, grade, tenor, resources, and reserves. The curriculum explores deep-seated ore-forming mechanisms such as liquid immiscibility, partial melting, and crystal fractionation within mafic-ultramafic systems, alongside mineral deposits resulting from global igneous, sedimentary, metamorphic, and weathering geochemical cycles. The programme introduces the spatial distribution of metallogenic provinces within a plate tectonic context, training students to analyze global mineral reserves using international classification systems, while gaining insight into strategic, critical, and essential commodities in accordance with the National Mineral Policy. Specialized instruction on Indian ore deposits equips students to evaluate the mode of occurrence, geographical distribution, classification, and genetic pathways of major industrial metals and minerals, including chromium, iron, manganese, copper, gold, bauxite, lead-zinc skarn deposits, barite, uranium, and precious gemstones. Finally, coverage of mining engineering and geology provides students with workflows for open-pit, underground, and ocean-bottom extraction methods, emphasizing exploratory mining layouts, mine planning protocols, and severe industrial hazards like mine inundation, deep fires, and rock bursts. Ultimately, students will evaluate key environmental issues and legislation governing the management of toxic mine tailings, preparing them to implement sustainable mining practices, which will be consolidated through field-based structural investigations at active industrial mine sites and metalliferous terrains.				
COURSE CONTENT / SYLLABUS					
UNIT-1	THEORY	Concept of the term's ore, gangue, grade, tenor, resources, reserves, Magmas and metallogeny; Inheritance factor; Liquid immiscibility, Partial melting and crystal fractionation as ore-forming processes; Ore genesis in mafic-ultramafic melts, Mineral deposits as products of geochemical cycles in relation to igneous, sedimentary, metamorphic and weathering processes, Patterns of distribution of ore deposits in global tectonic context; Resources and reserves and their classification, Strategic, critical and essential minerals, National Mineral Policy.			15 hrs.
UNIT-2	THEORY	Indian ore deposits: Mode of occurrence, geological and geographic distribution, classification and genesis of the following mineral deposits: Chromium, Iron, Manganese, Copper, Skarn Deposits, Lead and Zinc, Gold, Aluminum (Bauxite), Barite, Uranium, precious and semi-precious stones.			15 hrs.
UNIT-3	THEORY	Critical Minerals: Concepts and Strategic Importance: Definition and criteria for critical minerals (national and international lists – India, USA, EU, Australia). Strategic and economic significance for clean energy, defense, high-tech industries. India's critical mineral mission and policy framework (Ministry of Mines, KABIL), UNFC, Critical Minerals and Their Deposits Occurrence and exploration criteria: (Lithium, Rare Earth Elements (REE), Cobalt-Nickel, Graphite, Tantalum-Niobium, Vanadium, Tungsten, Scandium, Gallium, Germanium, Indium), Exploration Methodologies, Processing and Valuation Basics, Case Studies.			15 hrs.
UNIT-4	THEORY	Mining Geology: Terminology in mining, Planning, exploration and exploratory mining of surface and underground mineral deposits, Open pit mining, Ocean bottom mining, Mining Hazards: mine inundation, fire and rock burst, Mine planning and environmental issues related to mining, Sustainable mining practices; management of mine tailings and environmental legislation, Strategic vs Critical minerals.			15 hrs.
Field Details: Field visits to the mining sites and various ore deposits terrains.					
REFERENCES					
1.	Arogyaswamy, R.N. P (1980). Course in mining Geology, Oxford & IBH Pub. Co.				
2.	Williams Peter J. Exploration and mining geology. John Wiley & Sons, New York.				
3.	Chatterjee, K.K. (1993) An Introduction to Mineral Economics. Wiley Eastern Ltd.				
4.	Krishnaswamy, S. (1979) India's Mineral Resources; Oxford and IBH Co.				
5.	Asoke Mookherjee (1999) Ore genesis: a holistic approach, Allied Publishers.				
6.	Evans, A.M. (1993) Ore geology and industrial minerals, Blackwell.				
7.	McKinstry, H.E. (1962) Mining Geology, Asia Publishing House.				
8.	Clark, G. B. (1967) Elements of Mining, John Wiley.				
9.	Robb, L., 2005. Introduction to Ore-Forming Processes.				
10.	Craig, J.R. and Vaughan, D.J., 1994. Ore Microscopy and Ore Petrography.				
11.	Roedder, E., 1984. Fluid Inclusions (Reviews in Mineralogy, Vol. 12).				
12.	Halder, S.K., 2020. Mineral Exploration: Principles and Applications.				





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ACADEMIC YEAR- 2026-27



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Major Paper- 2: Geoheritage, Geoconservation and Geotourism	Credits:	4
Semester:	IV	Paper Code: MJGE-402	Hours:	60

Objectives:	The course is designed to provide students with a specialized, comprehensive grounding in the concepts and practical strategies governing the identification, protection, and sustainable utilization of the world's non-living nature, combining earth science values with socio-economic development. Students will learn the fundamental definitions and scopes of geoheritage, geodiversity, and geoconservation, assessing the scientific, educational, and cultural value of iconic geological landscapes under established UNESCO guidelines and the International Union of Geological Sciences (IUGS) frameworks. The programme introduces quantitative methods for mapping and auditing geoheritage resources, training students to evaluate geological sites across the Indian subcontinent. Instruction on geoconservation techniques equips students with the technical capacity to deploy geotechnical stabilization and restoration protocols for sensitive landforms, alongside implementing geospatial tools (Remote Sensing and GIS) for real-world site monitoring. Furthermore, coverage of geotourism principles prepares students to build effective interpretive materials and educational programs that translate complex Earth histories for the public. By exploring stakeholder engagement models and global case studies, students will analyze how the establishment of national and global Geoparks fosters rural employment opportunities and regional economic resilience. Ultimately, the curriculum prepares students to lead geo-heritage management initiatives and address emerging conservation policies, which will be consolidated through field-based structural assessments of critical geoheritage sites, national monuments, and prospective Geopark terrains.
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COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Geoheritage: Introduction to Geoheritage: Definition and scope of geoheritage, Importance and challenges of geoheritage conservation, The role of geologists in geoheritage management. Geological Features and Landscapes for geoheritage perspective, Case studies of iconic geological features around the world, UNESCO guidelines on Geoheritage and conservation, assessment and valuation of geoheritage resources, Methods for assessing and mapping geoheritage resources, Geoheritage of Indian Subcontinent.	15 hrs.
UNIT-2	THEORY Geoconservation: Principles of Geoconservation, geodiversity and its importance for geoconservation, Strategies for sustainable geoconservation and management of geoheritage sites. Geoconservation techniques and tools, techniques for site assessment, monitoring, and management, Geotechnical methods for stabilization and restoration of geological features, Use of geospatial tools and technologies in geoconservation.	15 hrs.
UNIT-3	THEORY Geotourism: Geotourism and Interpretation: Definition and principles of geotourism, Education for geoheritage and geotourism, Global case studies of successful geotourism initiatives, Geoheritage Policy and Management: Stakeholder engagement and participation in geoheritage management; current issues and future directions in Geoheritage: Emerging challenges and opportunities in geoheritage conservation and management.	15 hrs.
UNIT-4	THEORY Geopark- Concept of Geopark, Geopark through Geotourism, Employment opportunities and economic developments through Geotourism, Geopark potential of India.	15 hrs.

Field Details: Field Visits to geoheritage and geotourism sites.

REFERENCES

1.	F. Wolfgang Eder, Peter T. Bobrowsky, Jesus Martinez-Frias: Geoheritage, Geoparks and Geotourism (2023).
2.	Emmanuel Reynard, José Brilha: Geoheritage.- Assessment, Protection, and Management (2017).
3.	R.B. Singh, Dongying Wei, Subhash Anand: Global Geographical Heritage, Geoparks and Geotourism: Geoconservation and Development (Advances in Geographical and Environmental Sciences) (2021).
4.	Thomas A. Hose, Boydell & Brewer: Geoheritage and Geotourism: A European Perspective (2016).
5.	A Monograph on Potential Geoparks of India, Dr. D. Rajasekhar Reddy (Editor), INTACH (Indian National Trust for Art and Cultural Heritage), 2021.
6.	The UNESCO Global Geoparks Book: Celebrating Earth Heritage, Sustaining Local Communities, UNESCO, Gestalten, 2024.
7.	The First 100 IUGS Geological Heritage Sites, IUGS-ICG, 2022.
8.	The Second 100 IUGS Geological Heritage Sites, IUGS-ICG, 2025.





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ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Major Paper- 3: Hydrogeology	Credits:	4
Semester:	IV	Paper Code: MJGE-403	Hours:	60

Objectives: The course is designed to provide students with a comprehensive and quantitative grounding in the physical, chemical, and management principles that govern sub-surface and surface water resources. In the surface hydrology module, students will learn the dynamics of the global water balance, evaluating watershed characteristics, precipitation types, and gauge measurement techniques while mastering analytical estimations using arithmetic mean, Thiessen polygon, and isohyetal methods alongside hydrograph separation workflows. The programme introduces the elementary theories of groundwater dynamics, training students to analyze rock hydrologic properties and evaluate the validity range of Darcy's law. Specialized instruction in well hydraulics equips students with the mathematical frameworks to solve steady, unsteady, and radial fluid flows across confined and unconfined systems, utilizing graphical pumping test protocols to determine critical aquifer transmissivity and storability indices. Furthermore, coverage of environmental hydrogeology prepares students to evaluate water level fluctuations, assess groundwater quality, and model contamination pathways. Students will master coastal aquifer dynamics by analyzing the fresh-to-saltwater interface through the Ghyben-Herzberg principle to design prevention methodologies against marine intrusion. Ultimately, the curriculum prepares students to assess the groundwater provinces of India, formulate basin-wise inventories, and deploy artificial recharge structures to mitigate water logging and resource depletion, which will be consolidated through field-based well monitoring, data collection, and collaborative interactions with water management institutes and non-governmental organizations.

COURSE CONTENT / SYLLABUS

UNIT-1	THEORY Hydrological cycle and global water balance; watershed characteristics; Precipitation: formation, types (convictional, frontal, orographic, cyclonic), measurement (recording/non-recording gauges), analysis methods (arithmetic mean, Thiessen polygon, isohyetal), physical factors, graphical representation. Runoff: components, factors, hydrograph (shape, types, separation). Infiltration: factors, indices, seasonal variations. Evaporation, transpiration, total losses; hydrological parameters in groundwater studies; frequency analysis.	15 hrs.
UNIT-2	THEORY Groundwater: Groundwater Origin, types, importance, precipitation, evaporation, transpiration, evapotranspiration, infiltration, Hydrologic properties of rocks; Runoff, Elementary theory of groundwater flow; Darcy's law and its range of validity, Pumping tests – principles – types of pumping tests, procedures.	15 hrs.
UNIT-3	THEORY Determination of aquifer properties and well characteristics by simple graphical methods – significance of transmissivity and storability data. Ground water quality, estimation and methods of treatment for various uses, Water contaminants and pollutants, Well hydraulics: confined, unconfined, steady and unsteady and radial flows.	15 hrs.
UNIT-4	THEORY Groundwater levels and fluctuations: Various causes of water level fluctuations; Fresh and salt water relationship in coastal areas; Ghyben-Herzberg principle and its modification, Prevention and control of sea water intrusion, Groundwater provinces of India. Basin wise groundwater development: Groundwater inventory. Basic ideas of groundwater management, Artificial recharge and water logging. Quality and geochemistry of groundwater.	15 hrs.

Field Details: Field Visits for well monitoring and well data collections, visits to groundwater management institutes/NGOs.

REFERENCES

1.	Davies, S.N. and De Wiest, R.J.M. (1966) Hydrology, John Wiley, N.Y.
2.	Fetter, C.W. (1990) Applied Hydrology, Prentice Hall.
3.	Todd, D.K. (1980) Groundwater Hydrology. John Wiley & Sons, N.Y.
4.	Raghunath, H. M. (2006). Hydrology: principles, analysis and design. New Age International.
5.	Chow, V. T. (1965). Handbook of applied hydrology.
6.	Rao, N. S. (2016). Hydrogeology: problems with solutions. PHI Learning Pvt. Ltd.
7.	Freeze and Cherry (1979), Groundwater, Prentice Hall, Inc.
8.	Appelo, C. A. J., & Dieke Postma (2004). Geochemistry, Groundwater and Pollution.





**DEPARTMENT OF GEOSCIENCES
FACULTY OF SCIENCE
KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Major Paper- 4: Dissertation	Credits:	4
Semester:	IV	Paper Code: MJGE-404	Hours:	120

Objectives:

The course is designed to provide students with a rigorous capstone research experience, translating advanced theoretical knowledge into independent, applied scientific investigations within geology or its allied applied fields. Students will develop specialized competency in scientific research methodologies, digital database literacy, and computer-aided data processing, learning to define critical geological problems in active consultation with faculty or institutional supervisors. The curriculum guides students through the systemic processes of academic research, training them to execute comprehensive literature reviews, curate extensive bibliographies, and master academic referencing under the standardized APA citation format. The programme introduces independent fieldwork design and experimental protocol development, enabling students to systematically record statistical field data, construct empirical tables, and interpret analytical results using modern graphical and charting tools. Furthermore, by permitting collaborative thesis work across internal departments, national research institutes, or commercial industries, the course prepares students to assess multi-scale geological issues from diverse socio-environmental and industrial viewpoints. Ultimately, this independent study refines the students' capacities to synthesize complex datasets into a structured, comprehensive master's thesis, culminating in a formal thirty-minute oral defense that sharpens the technical presentation and communication skills required for successful careers in higher academia, consulting, and the global geoscientific workforce.

COURSE CONTENT / SYLLABUS

(Dissertation/ Project work/ Industrial Training Report Environmental Issue/Survey Project Report) 120 hrs.

The purpose of this exercise is to become familiar with research methods, computer application, literacy and the presentation skills. Moreover, to think about how to approach, communicate and assess geology and geological problems from various viewpoints. All viewpoints must be addressed in your outline and project. The student has the freedom to select any research problem related to geology of allied applied subjects; they can also work for their masters' thesis in the department, other academic or research institutes or industry with prior communication and approval from both the side.

1. Select any geological problem/ Research Problem in consultation with the faculty for proper guidance.
2. Learn what resources are available and how to access them
3. Collect references, secondary information on the topic and prepare bibliography
4. Set the methodology, approve it from faculty/supervisor and proceed for field and experimental work.
5. Collect findings Record Results (statistics/data tables)
6. Interpret and explain results (using charts)
7. Conclusion and preparation of detailed report/thesis
8. Use outline and related research for presentation of your work. The outline must include the following:
 - For guidelines and format/ consult faculty.
 - Literature Review section should include citations and/or references from previous studies of the topic
 - References must be taken from a book, journal, newspaper and Internet.
 - Make certain that your cited sources are in APA Citation Style.
 - A 30-minute formal oral presentation during the final examination.

REFERENCES

1.	The Earth Science Dissertation Guide: The What? Why? and How? of Dissertations by Greg Samways.
2.	How to Do Your Dissertation in Geography and Related Disciplines (3rd Edition) by Tony Parsons and Peter G. Knight.
3.	An Introduction to Scientific Research Methods in Geography and Environmental Studies by Daniel R. Montello and Paul Sutton.
4.	Writing for Science by Robert Goldbort.

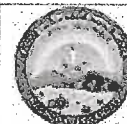


		DEPARTMENT OF GEOSCIENCES FACULTY OF SCIENCE KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY ACADEMIC YEAR- 2026-27			
Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)					
Year:	2	Major Paper- 5: Combined Practical			Credits: 4
Semester:	IV	Paper Code: MJGE-405			Hours: 120
Objectives:	The course is designed to provide students with comprehensive, hands-on laboratory expertise and field-data processing skills, reinforcing the theoretical frameworks of economic geology, mining operations, geoheritage conservation, hydrogeology, and advanced geospatial applications. In the economic and mining geology module, students will learn the macro-to-micro diagnostic features of valuable earth materials, developing technical proficiency in the megascopic and microscopic identification of industrial economic minerals and metallic ores, while utilizing scaled engineering models to evaluate surface and underground mining extraction processes. The curriculum introduces strategic administrative auditing tools for landform management, training students to perform rigorous Strengths, Weaknesses, Opportunities, and Threats (SWOT) analyses along with Threats, Opportunities, Weaknesses, and Strengths (TOWS) matrix assessments of prominent geoheritage and geoconservation sites using specialized thematic maps. Instruction on hydrogeology equips students with field-ready exploratory skills, covering applied subsurface groundwater investigations and chemical laboratory water-quality testing protocols to monitor contamination and salinity levels. Finally, the programme delivers advanced training in subsurface geological workflows by leveraging Remote Sensing (RS) and Geographic Information Systems (GIS) technologies to reconstruct structural cross-sections, prepare subsurface profiles, and execute automated watershed mapping. By synthesizing these computational and physical laboratory tracks, alongside experiential learning from targeted drilling site field visits, the course develops the practical competency required for advanced field exploration, resource management, and industrial career tracks.				
COURSE CONTENT / SYLLABUS					
LAB-1	PRACTICAL	Economic and Mining Geology: Maps, Megascopic and microscopic Economic Minerals and Ore, Model of mining Process.			30 hrs.
LAB-2	PRACTICAL	Geoheritage, Geoconservation and Geotourism: Maps, TWOS and SWOT Assessment of Geoheritage Sites.			30 hrs.
LAB-3	PRACTICAL	Hydrogeology: Groundwater Investigation, Water Quality Testing.			30 hrs.
LAB-4	PRACTICAL	Preparation of subsurface profiles, watershed mapping through GIS and RS, Drilling site visit.			30 hrs.
REFERENCES					
1.					
2.					
3.					





**DEPARTMENT OF GEOSCIENCES
FACULTY OF SCIENCE
KRANTIGURU SHYAMJI KRISHNA VERMA KACHCHH UNIVERSITY
ACADEMIC YEAR- 2026-27**



Master of Science in Geology: Regular (NEP-2020) (2 Year Programme)

Year:	2	Skill Enhancement Course (SEC): Field Techniques in Surveying and	Credits:	2
Semester:	IV	Software Application in Applied Geosciences	Hours:	60
Paper Code: SCGE-406				

Objectives:	The course is designed to provide students with advanced, hands-on technical proficiency in modern land surveying methodologies, geomatics data acquisition, and specialized software processing applications essential for industry-grade geological mapping. In the field techniques module, students will master fundamental spatial instrumentation and field-craft, learning the mechanics of the Brunton Compass, the spatial interpretation of Survey of India toposheets, and the structural execution of localized geological and topographic mapping. The curriculum introduces advanced geodetic and planar surveying frameworks, providing students with rigorous operational training on traditional instruments like the Plane Table and Prismatic Compass, alongside state-of-the-art spatial hardware including electronic Total Stations, Differential Global Positioning Systems (DGPS), and Unmanned Aerial Vehicles (UAVs/Drones) for high-resolution photogrammetric data collection. Concurrently, instructions in computer-aided software applications train students to integrate, model, and interpret raw digital data strings within industry-standard software platforms, including AutoCAD and associated geomatics programs, to compile precise topographic contours, structural alignments, and three-dimensional landform models. Ultimately, by combining computational data processing with mandatory field-based technical exercises across public, private, or industrial sectors, the programme equips students with the practical workflow capability required to lead professional engineering surveys, environmental site investigations, and mineral exploration ventures.
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COURSE CONTENT / SYLLABUS

SEC PRACTICAL

Field Techniques in Surveying: Use of Brunton Compass, Studying Toposheets, Geological and Topographic Mapping. 60 hrs.
Surveying Techniques: Plain Table Survey, Prismatic Compass, Total Station, DGPS, Drone Survey.
Software Application: AutoCAD and other softwares for the Data interpretation of Total Station, DGPS and Drone Survey.

Field Details: Fieldwork at Government, Private, Industrial, NGO etc. sectors

REFERENCES

1. P. K. Garg. Introduction to Surveying and Geomatics Engineering with Multiple Choice Questions. CBS Publishers. 2024.
2. Aylmer Johnson. Plane and Geodetic Surveying. 2nd Edition. CBC Publishers. 2014.
3. Surveying Vol. 1 by Dr. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain.
4. Elementary Surveying: An Introduction to Geomatics by Charles D. Ghilani and Paul R. Wolf.
5. The Fundamentals of Drone Photogrammetry, Mapping, and Survey by Thomas Dowell.



Distribution of Credits and Marks for Each Semester of M. Sc. Geology: Regular (NEP-2020) (2 Year Programme)

Semester – I				
Major Paper				
Paper Code	Title of the Paper	Credits		Marks
		Theory	Practical	(Internal (C) + External (U))
MJGE-101	Structural Geology and Geotectonics	4	0	100 (50 + 50)
MJGE-102	Igneous and Metamorphic Petrology	4	0	100 (50 + 50)
MJGE-103	Geomorphology and Landscape Evolution	4	0	100 (50 + 50)
MJGE-104	Advanced Mineralogy, Crystallography and Instrumentations	4	0	100 (50 + 50)
MJGE-105	Combined Practical	0	4	100 (50 + 50)
	Viva-voce			50 (25 + 25)
Skill Enhancement Course (SEC)				
SCGE-106	Field Techniques in Geology	0	2	50 (25 + 25)
Total Credits		16	6	Total Marks: 600 (300 + 300)
TOTAL CREDITS FOR SEMESTER - I		22		

Semester – II				
Major Paper				
Paper Code	Title of the Paper	Credits		Marks
		Theory	Practical	(Internal (C) + External (U))
MJGE-201	Principal of Stratigraphy, Sedimentology and Advanced Paleontology	4	0	100 (50 + 50)
MJGE-202	Geology of India with special emphasis on Gujarat	4	0	100 (50 + 50)
MJGE-203	Geochemistry and Isotope Geology	4	0	100 (50 + 50)
MJGE-204	Quaternary Geology and Geoarchaeology	4	0	100 (50 + 50)
MJGE-205	Combined Practical	0	4	100 (50 + 50)
	Viva-voce			50 (25 + 25)
Skill Enhancement Course (SEC)				
SCGE-206	Remote Sensing and GIS	1	1	50 (25 + 25)
Total Credits		17	5	Total Marks: 600 (300 + 300)
TOTAL CREDITS FOR SEMESTER - II		22		

Semester – III				
Major Paper				
Paper Code	Title of the Paper	Credits		Marks
		Theory	Practical	(Internal (C) + External (U))
MJGE-301	Oceanography, Climatology and Planetary science	4	0	100 (50 + 50)
MJGE-302	Geophysics, Seismology, Geodesy and Engineering Geology	4	0	100 (50 + 50)
MJGE-303	Environmental Geology and Disaster Management	4	0	100 (50 + 50)
MJGE-304	Fuel Geology	4	0	100 (50 + 50)
MJGE-305	Combined Practical	0	4	100 (50 + 50)
	Viva-voce			50 (25 + 25)
Skill Enhancement Course (SEC)				
SCGE-306	Internship on Geosciences	0	2	50 (25 + 25)
Total Credits		16	6	Total Marks: 600 (300 + 300)
TOTAL CREDITS FOR SEMESTER - III		22		

Semester – IV				
Major Paper				
Paper Code	Title of the Paper	Credits		Marks
		Theory	Practical	(Internal (C) + External (U))
MJGE-401	Economic and Mining Geology	4	0	100 (50 + 50)
MJGE-402	Geoheritage, Geoconservation and Geotourism	4	0	100 (50 + 50)
MJGE-403	Hydrogeology	4	0	100 (50 + 50)
MJGE-404	Dissertation	4	0	100 (50 + 50)
MJGE-405	Combined Practical	0	4	100 (50 + 50)
	Viva-voce			50 (25 + 25)
Skill Enhancement Course (SEC)				
SCGE-406	Field Techniques in Surveying and Software Application in Applied Geosciences	0	2	50 (25 + 25)
Total Credits		16	6	Total Marks: 600 (300 + 300)
TOTAL CREDITS FOR SEMESTER - IV		22		



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Head

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