

<p>Subject:</p> <p>Geology (M.Sc.)</p>	<p><i>After completion of the course the student will be able to :</i></p>
<p>Programme Outcome</p>	<p>PO1: Identify and understand geological phenomena and concepts, including geotectonics, structural geology, and mineral optics, and apply critical thinking to geologic field mapping, exploration, statistical analysis, and environmental issues.</p> <p>PO2: Demonstrate proficiency in using geoscience technologies and effectively present and document findings in English and an Indian language (e.g., Odia or Hindi).</p> <p>PO3: Develop skills for mediating disagreements, forming liaisons, and working collaboratively in various sectors, including government, public, private, and research institutes.</p> <p>PO4: Cultivate entrepreneurial skills to start and manage geoscience consultancies, mining leases, and industries such as cement and ceramics.</p> <p>PO5: Recognize and adhere to ethical and moral standards in the geoscience profession, taking responsibility in the workplace.</p> <p>PO6: Understand and assess environmental issues related to mining and mineral industries, focusing on sustainable development and natural hazard mitigation.</p> <p>PO7: Engage in independent and lifelong learning to adapt to geotechnological and socio-technological advancements.</p> <p>PO8: Analyze spatial and temporal relationships between Earth processes and products, including the development and evolution of Earth's spheres (lithosphere, hydrosphere, atmosphere, and biosphere).</p> <p>PO9: Assess and manage geo-hazards such as earthquakes, floods, landslides, tsunamis, and volcanic eruptions, and implement damage mitigation strategies.</p> <p>PO10: Employ computer techniques, software, and microscopy for geological research and data analysis, and identify and interpret fossils and groundwater behavior.</p>

<p>Programme Specific Outcome</p>	<p>PSO1: The Master of Science program in Geology offers an interdisciplinary Post-Graduate degree in Geology with the objective of understanding the nature and characteristics of different branches of Geology, thus educating students for success as a geo-scientist in government sector, public sector, private sector, research institutes, or further pursuit of Doctoral studies</p> <p>PSO2: Analyse the relationships among different branches of Geology with a goal to demonstrate content knowledge appropriate to professional career goals.</p> <p>PSO3: Perform procedures to apply theoretical, conceptual and observational knowledge to the analysis and interpretation of geologic data through hands on laboratory practice, field studies, preparation of maps and charts</p> <p>PSO4: Apply the basic concepts learned by the students to execute them by compiling critique geologic literature pertinent to original research; communicating geologic knowledge, findings and interpreting reports in academic, scientific institutions and industrial organizations.</p>
<p>Course Outcome</p>	
<p>Semester-I</p>	
<p>GL. C. 411 Crystallography & General Geology</p>	<p>CO1: Understand the basic concept of crystal structure, its relation to mineral constitution and its role in crystal geometry.</p> <p>CO2: Analyse various concepts of Physical Geology & Crystallography and understand them through case studies</p> <p>CO3: Apply the theoretical knowledge in understanding earth elements through hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>GL. C. 412 (Meteorology & Environmental Geology and Marine Geology)</p>	<p>CO1: Understand the elements of oceanography, weather and climate, various types of natural hazards (causes, consequences, mitigation measures) and sources of renewable energy.</p> <p>CO2: Analyse various concepts of Oceanography, Meteorology & Environmental Geology and understand them through case studies</p> <p>CO3: Apply the theoretical knowledge in understanding various phenomena through preparation of weather charts and maps.</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>GL. C. 413 (Mineralogy & Optical</p>	<p>CO1: Understand the basic properties (physical, optical and chemical) of minerals, their classification and uses.</p>

mineralogy)	<p>CO2: Analyse various concepts of optical phenomena concerning mineral identification</p> <p>CO3: Apply the theoretical knowledge of mineral structure and properties through hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course</p>
GL. C. 414 Geomorphology & Geo-statistics and Remote Sensing)	<p>CO1: Understand the basic concepts of Geomorphology and Remote Sensing</p> <p>CO2: Analyse various concepts of remote sensing with reference to management of various Earth resources and understand them through case studies</p> <p>CO3: Apply the theoretical knowledge in understanding various themes and preparing maps through hands on laboratory practice</p> <p>CO4: Execute field studies so as to verify the theoretical knowledge gained in the course.</p>
GL. C. 415 (Practical Corresponding to Course No. GL. C.411 and GL. C.412)	<p>CO1: Understand the various crystal classes and meteorological phenomena.</p> <p>CO2: Analyse various concepts of crystallography about crystal identification</p> <p>CO3: Apply the theoretical knowledge in crystal structure through hands-on laboratory practice and preparation of weather chart.</p> <p>Co4: Apply different statistical tools to solve geological problems</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
GL. C. 416 (Practical Corresponding to Course No. GL. C.413 and GL. C.414)	<p>CO1: Understand various mineral groups and elements of remote sensing.</p> <p>CO2: Analyse various concepts of mineralogy and optical mineralogy in relation to mineral identification</p> <p>CO3: Apply the theoretical knowledge of mineralogy and remote sensing through hands on laboratory practice and preparation of thematic maps</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
Semester-II	
GL. C. 421 (Igneous Petrology - A (Principles of Igneous rock formation) & Igneous Petrology - B (Classification and petro genesis igneous rocks)	<p>CO1: Understand the basic concepts of igneous rocks, their classification, formation and petro genesis.</p> <p>CO2: Analyse various concepts of igneous petrology about their identification</p> <p>CO3: Apply the theoretical knowledge in the process of classification, identification and formation through hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
GL. C. 422 (Sedimentary Petrology & Metamorphic Petrology)	<p>CO1: Understand the basic concepts of metamorphic and sedimentary rocks, their classification, formation and petro genesis.</p> <p>CO2: Analyse various concepts of metamorphic and</p>

	<p>sedimentary petrology in relation to their identification</p> <p>CO3: Apply the theoretical knowledge in the process of classification, identification, and formation of metamorphic and sedimentary rocks through hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
GL. C. 423 (Structural Geology & Geotectonics)	<p>CO1: Understand various concepts of Structural Geology.</p> <p>CO2: Analyse various concepts of structures about rock types</p> <p>CO3: Apply the theoretical knowledge of structures through hands-on laboratory practice and preparation of structural and base maps</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
GL. C. 424 (Practical corresponding to Course GL. C. 421 and GL. C. 422)	<p>CO1: Understand various rock types</p> <p>CO2: Analyse various concepts of petrology in relation to rock identification</p> <p>CO3: Apply the theoretical knowledge of petrology through hands on laboratory practice and preparation of various diagrams.</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
GL. C. 425 (Practical Corresponding to Course GL. C. 423 and Report on geological mapping)	<p>CO1: Understand various concepts of Structural Geology.</p> <p>CO2: Analyse various concepts of structures in relation to rock types</p> <p>CO3: Apply the theoretical knowledge of structures through hands on laboratory practice and preparation of structural and base maps</p> <p>CO4: Execute field studies so as to verify the theoretical knowledge gained in the course.</p>
GL. C. 426 Seminar and Field report	CO1: Develop the presentation and investigation skills.
Semester-III	
GL. C. 511 (Hydrology & Engineering Geology)	<p>CO1: Understand the basic concepts of groundwater geology and Engineering Geology</p> <p>CO2: Analyse various aspects of groundwater and engineering structures concerning various rock types and understand them through case studies</p> <p>CO3: Apply the theoretical knowledge in understanding various aspects through physicochemical analysis and preparation of maps through hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
GL. C. 512 (Geochemistry & Theories of Mineral Formation, Mineral Exploration and Surveying)	<p>CO1: Understand the basic concepts of formation and exploration of mineral deposits and geochemistry.</p> <p>CO2: Analyse various aspects of formation mechanism concerning various ore deposits and understand them through case studies</p>

	<p>CO3: Apply the theoretical knowledge in understanding various economic mineral deposits through phase diagrams and hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>GL. C. 513 (Metallic Minerals/ Ores & Industrial Minerals)</p>	<p>CO1: Understand the basic concepts of ores and industrial minerals.</p> <p>CO2: Analyse various aspects of ores and industrial mineral deposits such as genesis, distribution, mode of occurrences, and uses and understand them through case studies</p> <p>CO3: Apply the theoretical knowledge in understanding and identifying various ores and industrial mineral deposits through phase diagrams and hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>GL. C. 514 (Fossil Fuels, Nuclear Minerals and Mineral economics & Environmental Laws and Mining Laws)</p>	<p>CO1: Understand the basic concepts of coal, petroleum, and nuclear minerals. Understand the different provisions of mineral economics, environmental and mining laws.</p> <p>CO2: Analyse various types of coal, petroleum, and nuclear minerals such as genesis, distribution, mode of occurrences, and uses and understand them through case studies.</p> <p>CO3: Apply the theoretical knowledge in understanding and identifying various coal types and nuclear mineral deposits through hands-on laboratory practice</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>GL. C. 515 (Practical Corresponding to Course No. GL. C. 511 and GL. C. 512)</p>	<p>CO1: Understand various rock aquifer properties, engineering properties of soils and rocks and surveying.</p> <p>CO2: Analyse various aquifer parameters in relation to groundwater and engineering structure</p> <p>CO3: Apply the theoretical knowledge of hydrology and engineering geology through hands on laboratory practice, preparation of various diagrams and conducting surveying.</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course. Determination of pH, Temperature, TDS, and other parameters for groundwater quality</p>
<p>GL. C. 516 (Practical Corresponding to Course No. GL. C. 513 and GL. C. 514)</p>	<p>CO1: Understand various ores and industrial minerals.</p> <p>CO2: Analyse various concepts of economic geology concerning their economic properties.</p> <p>CO3: Apply the theoretical knowledge of economic geology through hands-on laboratory practice and preparation of various maps and flow charts.</p> <p>CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>Semester-IV</p>	

<p>GL. C. 521 (Invertebrate Paleontology & Paleobotany, Paleopalynology, Vertebrate Paleontology and Micropaleontology)</p>	<p>CO1: Understand the basic concepts of the evolution of life. CO2: Analyse various aspects of fossil science (vertebrate, invertebrate, plant, spore, pollen, and microfossils) about their identification CO3: Apply the theoretical knowledge of classification, identification, evolution, and morphology through hands-on laboratory practice CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>GL. C. 522 (Precambrian Stratigraphy & Phanerozoic Stratigraphy)</p>	<p>CO1: Understand the basic concepts of principles of stratigraphy. CO2: Analyse various aspects of chronology about their lithology, fossil contents and economic importance. CO3. Apply the theoretical knowledge of stratigraphic correlation through hands-on laboratory practice. CO4: Execute field studies to verify the theoretical knowledge gained in the course.</p>
<p>GL. E. 523 (ORE GENESIS)</p>	<p>CO1: Understand the basic concepts of ores with special emphasis on their genesis. CO2: Analyse various aspects of ore deposits such as genesis, distribution, mode of occurrences, uses and understand them through case studies CO3: Apply the theoretical knowledge in understanding and identifying various ore deposits through phase diagrams and hands-on laboratory practice CO4: Execute field studies to verify the theoretical knowledge gained in the course</p>
<p>GL. C. 524 (Practical Corresponding to Course GL. C. 521 and GL. C. 522)</p>	<p>CO1: Understand the basic concepts of principles of Palaeontology and Stratigraphy. CO2: Analyse various branches of palaeontology chronology about identifications of fossils (vertebrate, invertebrate, plant, spore, pollen and microfossils) CO3: Apply the theoretical knowledge of the morphology of fossils for identification through hands-on laboratory practice. CO4: Execute field studies on fossil sites to verify the theoretical knowledge gained in the course.</p>
<p>GL. E. 525 (Practical Corresponding to Course AG. E. 523 and dissertation/ field Report)</p>	<p>CO1: Understand the basic concepts of ores with special emphasis on their genesis. CO2: Analyse various aspects of ore deposits such as genesis, distribution, mode of occurrences, uses and understand them through case studies CO3: Apply the theoretical knowledge in understanding and identifying various ore deposits through phase diagrams and hands-on laboratory practice CO4: Execute field studies to verify the theoretical knowledge gained in the course</p>
<p>GL. C. 526 (Project)</p>	