GEOLOGY DEPARTEMNT

Program Specific Outcomes (PSO)

The Geology Department of St. Anthony's College, affiliated to the North Eastern Hill University (NEHU), offers a three-year Degree course with Geology as an Honours subject only and not as a subsidiary subject. The affiliating university has framed a syllabus with the intention of imparting the basics of the study of earth and laying the foundation on which higher studies can be opted for in the science of Geology. The 3-year course is structured to develop the science of the earth in a gradual and systematic manner and takes into consideration of achieving the following outcomes though an intimate teaching and learning process:

Paper No.	Program Specific Outcomes
GELH 101	Know the different characteristics of the minerals that make up rocks. Learn about earth's external as well as internal earth processes
GELH 102 Prac.	Develop the ability to recognize minerals in hand or microscope scale.
GELH301	Develop the ability to recognize rock structures of the earth's crust and appreciate global earth movements
GELH302 Prac	Learn to read maps and analyze rock structures
GELH 401	Exposure to the description of the rocks of many regions of the country and their fossil content
GELH 402 Prac.	Study rocks of type areas and develop the ability to identify fossils
GELH501	Build up a deeper understanding of rocks and their formation
GELH 502 Prac.	Increase the expertise to identify more rocks under the microscope and hand specimens
GELH 503	Gain knowledge of formation of mineral deposits and their distribution
GELH 504 Prac.	Develop the ability to identify economic minerals
GELH 601	Understand the basics of remote sensing and groundwater hydrology
GELH 602 Prac.	Know how to identify geomorphological and structural features in aerial photographs and estimate groundwater flow

GELH 603	**Understand the application of geology in exploration, drilling, mining and engineering projects and the importance of geology in environmental studies**
GELH 604 Prac.	**Learn to analyze geological data and prepare Field-Reports of the field-trips done through the 6 semesters and face viva-voce**

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GEOLOGY DEPARTMENT

COURSE OUTCOMES

The 3-year Geology Honours Degree course is split into 6 Semesters of approximately 6 months duration each. There are 8 Theory papers accompanied by 8 Practical papers and 1 paper completely devoted to the Field-Work(s) performed over the 3-year period. In the initial two years, there are 1 Theory paper and 1 Practical paper in each Semester while in the final year there are 2 Theory papers and 2 Practical papers in each Semester, plus 1 Practical paper based on Field-Work.

The Course Outcomes (CO) for each of the Semesters are outlined below:

Semester	Paper No. & Name	Course Outcomes
I	GELH 101 – General Geology and Crystallography & Mineralogy	Learn the varied crystals and minerals that make up the rocks of the earth and understand surficial natural processes as well as getting an overview of global earth processes. On completion of the Semester, a student should: • Have a concept of the origin of the earth • Know the Geological Time Scale • Be familiar with geological processes such as running-water, wind, glaciers and their associated landforms • Basic concept on the transitions of three basic rocks through geological time in a Rock cycle • In-depth understand about earth internal structure and its composition. • Conceptual informations on Plate Tectonics , earthquake and volcanoes. • Become familiar with the common minerals that make up rocks • Have a detailed knowledge of crystals/crystallography • Get acquainted with optical mineralogy • Recognize minerals on the basis of their physical and optical properties

I	**GELH 102 – Crystallography and Mineralogy**	**Study common crystals and minerals in hand specimens and under the microscope and their identification**
II	**GELH 201 - Petrology**	**Study of the Igneous, Sedimentary and Metamorphic rocks that make the earth. On completion, a student should:** • **Understand magma** • **Understand about modes of occurrence of igneous rocks** • **Get the concept of formation of igneous rocks from a magma** • **Get to know the textures and structures of igneous rocks** • **Distinguish the common igneous rocks** • **Understand the processes of formation of sedimentary rocks** • **Distinguish clastic and non-clastic rocks** • **Recognize the common sedimentary rocks** • **Know the concept of metamorphism** • **Know about metamorphic rock fabrics** • **Distinguish and describe the common metamorphic rocks from each other**
II	**GELH 202 - Petrology**	**Recognize and identify different rocks in hand specimen as well as under the microscope**

III	**GELH 301 – Structural Geology and Geotectonics**	**Learn about the rock structures and global tectonics. On completion, a student should:** • **Have an understanding of rock deformation** • **Differentiate primary and secondary structures** • **Know folding** • **Know faults** • **Have a concept of foliation and lineation** • **Understand stress and strain** • **Understand unconformities** • **Have a concept of Continental Drift** • **Develop the concept of Plate Tectonics** • **Appreciate the intricacies of Plate Tectonism with geological time**
III	**GELH 302 – Structural Geology**	**Learn to read topographic maps and geological maps. Understand the concept of map scale. Draw topographic and geological map sections. Learn to use stereonets to analyze structural data**
IV	**GELH 401 – Stratigraphy and Paleontology**	**Learn to appreciate the stratigraphy of different regions of the country. Develop the ability to distinguish the morphological features of fossils and classify them into different groups. At the end of the semester, a student should:** • **Understand the principles of stratigraphy** • **Know the concept of correlation of rocks** • **Understand the methods of description of stratified rocks** • **Be aware of the stratigraphy of different regions of the country from older to younger geological time** • **Know what are fossils and processes of fossilization** • **Know to distinguish the common index fossils on the basis of their morphology** • **Decipher the evolutionary trends of a few selected fossils** • **Know to distinguish the common plant fossils** • **Know about the vertebrate fossils of the country**

IV	**GELH 402 - Stratigraphy and Paleontology**	**Learn the characteristics rocks from different stratigraphic horizons of the country. Develop the ability to meticulously draw and label fossils. Recognize fossils from various stratigraphic ages on the basis of their morphologies**
V	**GELH 501 – Igneous, Sedimentary and Metamorphic Petrology**	**Acquire a deeper understanding of rocks with their genesis and thermo-dynamic significance. Learn to handle more rock types and get a knowledge about some unique rocks and their formation. At the end of the semester, a student should:** • **Have a detailed knowledge of magma – magma generation, origin, types, ascent and diversification** • **Have an introductory knowledge of thermo-dynamics** • **Understand the Phase Rule and crystallization from magmatic melts of a few systems** • **Understand the petrogenesis of some characteristic rocks and rock textures** • **Understand fluid flow and sedimentation** • **Have a concept of provenance of sediments and sedimentary facies** • **Gain the concept of metamorphic changes in rocks** • **Develop the concept of metamorphic facies** • **Understand regional metamorphism of some distinctive rocks** • **Know some characteristic metamorphic rocks**
V	**GELH 502 – Igneous, Sedimentary and Metamorphic Petrology**	**Acquire the capacity to handle more rock types and develop the skill to identify rocks in hand specimen as well as under the microscope**

V	**GELH 503 – Economic Geology**	**Appreciate the economic significance of minerals along with their generation and distribution. After the completion of the semester, a student should:** • **Know what is an ore** • **Have a concept of the varied processes involved in the formation of economic mineral deposits** • **Learn to classify economic mineral deposits** • **Understand the genesis and distribution in India of some useful economic mineral deposits** • **Learn about petroleum – its origin, migration and accumulation and distribution** • **Have an idea of a formation of radioactive mineral deposits as uranium and thorium** • **Know in detail about the formation, qualities, constituents and distribution of coal in India**
V	**GELH 504 - Economic Geology**	**Gain the skills to identify economic minerals on the basis of their physical properties. Also, identify characteristic economic minerals from some distinctive industries**

VI	GELH 601 - Remote Sensing and Hydrology	Builds an appreciation of the significance of geology in the realm of space and groundwater. The paper attempts to introduce students to the applications of geology. At the end of the semester, a student must: • Know the concept of remote sensing • Conceptual knowledge on the process of remote sensing • Have a firm understanding on Sensors and Platforms. • Identify the photoelements of aerial photographs and satellite images • Appreciate 3-D perceptions in remote sensing • Have the knowledge of the applications of remote sensing in geological studies • Develop an elementary knowledge of identifying geological features in aerial photographs • Basic concept on Photogrammetry. • Have a working knowledge of GPS and GIS • Have a concept of the relationship between the hydrologic cycle and groundwater • Know about aquifers and aquifer properties • Have a basic concept of groundwater exploration • Have an elementary idea of where to put up a well • Know of the methods of recharge of groundwater • Identify the sources of groundwater pollution
VI	GELH 602 – Remote Sensing and Hydrology	Develop the ability to identify geological features in aerial photos along with Identification and tracing of lithology and drainage patterns. Learn to estimate groundwater flow and demarcate zones based on water quality/pollution

VI	**GELH 603 – Applied Geology (Exploration, Mining and Engineering Geology)**	**This Paper delves into other applied aspects of geology. It attempts to expose students of the intimacy of geology with exploration, geophysics and geochemistry, mining and engineering. It is basically introductory in nature and at the end of the semester, a student should:** • **Have a concept of geological exploration and the stages involved** • **Have an elementary knowledge about sampling** • **Acquire the concepts of varied types of geophysical surveys** • **Have a concept of geochemical exploration** • **Have an elementary idea of common mining terms** • **Know about some common coal mining methods** • **Appreciate the significance and importance of geological studies in the construction of engineering projects as dams, tunnels and highways** • **Understand mass movement and the causes of landslides and their mitigation**
VI	**GELH 604 – Field-work and Field-report**	**Presentation of the Field-Reports based on the field-trips attended over the three-year course. This part of the syllabus attempts to develop the writing skills necessary for a geological field-report through collection of previous data, noting field observances, analyzing data and preparing a comprehensive explanation of the geology of an area**

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