

Department of Geology
Sri Dev Suman Uttarakhand University
Badshahithaul, Tehri Garhwal



Geology Course Structure
for
Higher Education

(Under National Education Policy-2020)

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2025

NATIONAL EDUCATION POLICY-2020

Syllabus

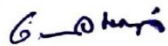


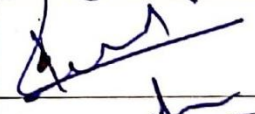

*Bachelor of Science (Geology) /Master of Science
(Geology)*

Geology

DEPARTMENT OF GEOLOGY

FACULTY OF SCIENCE

SRI DEV SUMAN UTTARAKHAND VISHWAVIDYALAYA

S. No.	Name	Designation	Signature
01	Prof. G. K. Dhingra	Dean Science	
02	Dr. S. K. Nautiyal	HOD Geology	
03	Prof. Yashpal Sundriyal	Subject Expert	
04	Dr Pramod Kumar Anthwal	Faculty Member	
05	Dr Gajender Kumar	Faculty Member	

Geology Course Structure for Higher Education

Course Title	Course Type	Nature of Course		Credits	Semester
		Theory (T)	Lab (L)		
Physical Geology	DSC	T (03)	L (01)	4	1
Minerals and Gems	DSC	T (03)	L (01)	4	2
Petrology	DSC	T (03)	L (01)	4	3
Historical geology	DSC	T (03)	L (01)	4	4
Resource and Mining Geology	DSC	T (03)	L (01)	4	5
Photogeology and Engineering Geology	DSC	T (03)	L (01)	4	6
Structural geology	DSC	T (03)	L (01)	4	7
Mineralogy and Geochemistry	DSC	T (03)	L (01)	4	8
Geodynamics	DSC	T (04)	L (0)	4	9
Fuel Geology	DSC	T (04)	L (0)	4	10
Introductory Geology	GE	T (04)	L (0)	4	1
Geological Processes	GE	T (04)	L (0)	4	2
Geohazard Management	GE	T (04)	L (0)	4	3
Geology of India	GE	T (04)	L (0)	4	4
Evolution of Life	GE	T (04)	L (0)	4	5
Mineral and Fuel Resources of India	GE	T (04)	L (0)	4	6
Igneous Petrology	GE	T (03)	L (01)	4	7
Metamorphic Petrology	GE	T (03)	L (01)	4	7
Sedimentology	GE	T (03)	L (01)	4	7
Economic Geology	GE	T (03)	L (01)	4	8
Paleontology	GE	T (03)	L (01)	4	8
Basin Analysis and Sequence Stratigraphy/ Glacial Geology	GE	T (03)	L (01)	4	8
Remote Sensing and GIS	GE	T (03)	L (01)	4	9
Hydrogeology	GE	T (03)	L (01)	4	9
Micropaleontology and Oceanography	GE	T (03)	L (01)	4	9

Tectonic Geomorphology	GE	T (03)	L (01)	4	10
Engineering Geology	GE	T (03)	L (01)	4	10
Mineral Exploration and Mineral Economics	GE	T (03)	L (01)	4	10
Geohazard Management	DSE	T (04)	L (0)	4	3
Geology of India	DSE	T (04)	L (0)	4	4
Evolution of Life	DSE	T (04)	L (0)	4	5
Mineral and Fuel Resources of India	DSE	T (04)	L (0)	4	6
Igneous Petrology	DSE	T (03)	L (01)	4	7
Metamorphic Petrology	DSE	T (03)	L (01)	4	7
Sedimentology	DSE	T (03)	L (01)	4	7
Economic Geology	DSE	T (03)	L (01)	4	8
Paleontology	DSE	T (03)	L (01)	4	8
Basin Analysis and Sequence Stratigraphy/Glacial Geology	DSE	T (03)	L (01)	4	8
Remote Sensing and GIS	DSE	T (03)	L (01)	4	9
Hydrogeology	DSE	T (03)	L (01)	4	9
Micropaleontology and Oceanography	DSE	T (03)	L (01)	4	9
Tectonic Geomorphology	DSE	T (03)	L (01)	4	10
Engineering Geology	DSE	T (03)	L (01)	4	10
Mineral Exploration and Mineral Economics	DSE	T (03)	L (01)	4	10
Academic Project Based on Field Training	IAPC	T (0)	L (06)	6	7
Dissertation	IAPC	T (0)	L (06)	6	8
Academic Project Based on Field Training	IAPC	T (0)	L (06)	6	9
Dissertation	IAPC	T (0)	L (06)	6	10

PROGRAMME PREREQUISITES: -

Students who have completed intermediate Science with a Mathematics/Biology group or an equivalent examination can choose geology as a subject in the **six-semester B.Sc.** program (undergraduate level). They should be intensely interested in comprehending the earth's forming processes through time and possess a natural flair for geoscientific study and research. Candidates who have completed the three-year B.Sc. examination from any recognized university, including Sri Dev Suman Uttarakhand University, or an equivalent examination from other universities, with Geology as one of their major subjects in all three years, can apply for admission to the **Four Semester M.Sc.** program in Geology.

PROGRAMME INTRODUCTION: -

Geology is an ever advancing and most popular branch of pure and applied science amongst students having a keen interest and curiosity in understanding the origin, evolution, nature, composition, structure and processes of the Earth and its environs through time. The identification of minerals, rocks, and fossils provides insights into the age, composition, structure, and paleoenvironment of the Earth and the life that thrived on it through the geological ages. This leads to understanding the physical processes of the Earth's spatiotemporal evolution and the availability of its natural resources and reserves. A thorough knowledge of various domains of geology is, thus, beneficial in not only enriching our understanding of different physical and historical aspects of the Earth's evolution and dynamics but also in judiciously utilising its precious natural resources as well as efficiently preventing or mitigating disasters that could be caused as a result of the Earth's powerful endogenic and exogenic processes.

The programme offers fundamental and advanced knowledge and technical skills in various domains of geology. Students would study core and applied aspects of recent technological advances in the subject field. The curriculum of the programme is designed in such a stepwise manner that the student can derive benefit at any stage of the programme even if the entire course still needs to be completed; it begins with basic essential knowledge and gradually covers advanced aspects of the subject. At the end of every academic year, the student will have a good understanding of some basic and applied aspects of the subject, which will keep growing as the student proceeds further with the subject course. At a later stage of the course, the curriculum provides the student with an opportunity to carry out field and laboratory-based project work leading to a dissertation in a specialised domain of geology, which is a training of making a professional geologist competent in generating, analysing, and synthesising the data, to resolve geoscientific problems.

The geology program opens doors to a wide range of career opportunities in fields such as geoscience, disaster management, natural resource assessment and management, civil engineering construction projects, natural environment conservation, and other allied fields. By choosing the courses offered in geology, candidates can have their way to a rewarding career in these sectors.



PROGRAMME OUTCOMES (POs)

The curricula of the subject of geology are designed keeping in view the following programme. outcomes:

PO1	Enabling the students to understand the age, composition, structure, processes, and evolutionary history of the Earth.
PO2	Enabling the students to identify, locate, explore, judiciously exploit, and manage various earth resources like minerals, fossil fuel and natural gas, coal, building stones, weathered crust and soils, underground and surface water etc.
PO3	Enabling the students to understand and assess the potential of natural processes in causing hazards and disasters.
PO4	Enabling the students to understand such geological conditions that make the terrain prone to natural and anthropogenic hazards.
PO5	Enabling the students to assess the suitability of terrain for various civil engineering constructions such as dams, reservoirs, bridges, tunnels, roads, railway lines, cable-cars, and buildings etc.
PO6	Enabling the students to formulate and execute guidelines for safe developmental activities in diverse geological terrains.
PO7	Motivating the students to take up higher studies and research to bring out new knowledge. Yet to be understood the geological aspects of the Earth.

Programme Specific Outcomes (PSOs) for *UG I Year/Certificate Course in Science*

Programme Specific Prerequisites: To acquire a *Certificate in Science*, with geology as one of the major subjects, a student should have passed 10+2 with science background having either Mathematics/Biology group or equivalent subjects. The candidate may have keen interest in understanding the earth forming processes and its evolution through time.

PSOs: This programme pertains to basic and applied knowledge on the essential components of geology, in which the students will know the broad physical aspects of the earth and learn to identify different minerals and gemstones. This programme will impart knowledge on diverse branches of the subject, as well as endogenic and exogenic processes, and geomorphic features of the earth. At the end of the programme the student will have basic knowledge about the rock forming minerals, characteristics properties of gemstones, and the subject domain of geology that are required for further academic progression as well as preparation for competitive examinations.

Programme Specific Outcomes (PSOs) for UG II Year/Diploma Course in Science

Programme Specific Prerequisites: To acquire *Diploma in Science*, with geology as one of the major subjects, a student should have obtained Certificate Course in Science from any recognized university.

PSOs: This programme provides broad understanding on various physical and historical aspects of the earth. Having understood the broad physical aspects of the Earth, its constituents, and rock-forming minerals in the two semester *Certificate of Science* programme, the students will gain knowledge on rock forming processes in one semester, and faunal and floral life of the geological past in another semester. The programme will enable the students to identify different rocks and rock forming processes (petrogenesis) on the basis of minerals, structure, composition, megascopic, and microscopic characters by observing rocks at outcrops, in hand specimens and thin sections. It will also enable them to identify different types of animal and plant fossils, and to understand the origin and evolution of life on the earth.

Programme Specific Outcomes (PSOs) for UG III Year/Bachelor of Science

Programme Specific Prerequisites: To acquire a *Bachelor of Science* degree, with geology as one of the major subjects, a student should have obtained Diploma Course in Science from any recognized university. Student should have a learning aptitude towards rocks and ores.

PSOs: Having understood basic physical and historical aspects of the earth as *Diploma in Science* programme, the students of this programme will gain added knowledge on earth resources, environment, geological controls on the safety of civil engineering construction, and evolution of the earth through time. They will also learn the basics of the fast-growing remote sensing technology, and its application potential in geological investigations. The programme will enable the students to understand such aspects of the earth as its composition, structure, natural resources, terrain, and life evolution through time and space, geological process leading to environmental degradation and hazards, and endangering the safety of civil engineering constructions, as also the techniques of earth resource exploration and using remote sensing technique in geological investigations.

Programme specific outcomes (PSOs) for PG I Year / Bachelor of Science (Honours)

Programme Specific Prerequisites: To acquire *Bachelor of Science (Honours)* degree, in Geology, a student should have obtained three-year *Bachelor of Science* degree from any recognized university.

PSOs: Under this programme, the students will gain in-depth knowledge on successive advancements in the subject of geology. Focus of this programme is to inculcate in the students the spirit of researching, identifying the knowledge-gaps in the specific core branches of geology, and motivating them to take up and address such geo-scientific

problems in future. The programme will enable the students to understand the intricacies of various mineral, rock, and terrain forming processes resulting from spatio-temporal variations under the prevailing physico-chemical conditions. Such a knowledge will make them able to locate, explore, and judiciously utilize the Earth's resources, solving the complex geological problems, providing the geo- engineering solutions to sundry geo-environmental problems, including the hazard vulnerability, and safety and stability of civil engineering structures, as well as fill-up the knowledge-gaps pertaining to core branches of geology.

Programme specific outcomes (PSOs): for PG II Year/ Master of Science (Geology)

Programme Specific Prerequisites: To acquire *Master of Science*, in Geology, a student should have obtained three-year *Bachelor of Science* and *one year Bachelor of Science (honours)* from any recognized university. Student should have research-oriented aptitude for gaining the advanced knowledge in the subject field so that he/she can apply the gained knowledge to resolve related research and professional issues.

PSOs: Under this programme, the students will gain in-depth, advanced knowledge on core branches of geology, as well as newly developed branches and techniques in the subject field, with particular focus on the applied aspects of it. After completing this programme, the students will have wide-spectrum, in-depth knowledge in the subject of geology, covering basic principles, gradual advancements, and classical and recent concepts. The students will be able to identify, analyse, and solve different types of geological problems, to ensure developmental activities and optimum harnessing of the earth resources without adversely affecting the geo-environment or endangering the terrain stability, and to analyse the vulnerability of any terrain to various types of geo-hazards. It will also instill in them the quest for better understanding of the subject through incessant pursuance and research.

