

Department of Geology
School of Earth Sciences
HNB Garhwal University, Srinagar Garhwal
Pre-Ph.D. coursework in Geology (15 credits)

1. **INTRODUCTION:** Successful completion of Pre-PhD course is mandatory to register for Ph. D. Programme. Objective of this course is to facilitate the research work of each candidate and to help him/her knowledge in core and elective papers concerning the research problem. Outline of the course is given.

2. **STRUCTURE OF THE COURSE:** The six months course will carry 15 credit points. The course work shall consist of the following:

A. Two Core courses

B. Two Elective courses

Core courses shall be mandatory for all students and the total number of credits for core and elective courses shall be of **15 credits** with the following pattern:

a) Core course 4+3 credits (two courses) 7 credits (marks: 60+40 each paper)

b) Elective course 4+4 credits (two courses) 8 credits (marks: 60+40 each paper)

3. **EXAMINATION AND EVALUATION OF THE COURSEWORK:**

A. Evaluation shall be done on a continuous basis. For the purpose of uniformity, there will be two sessional tests and one End- semester examination. Sessional tests (of one hour's duration) may employ one or more assessment tools such as objective tests, assignments, paper presentation, laboratory work etc. suitable to the course.

B. Students shall compulsorily attend the two sessional tests, failing which they will not be allowed to appear for the end semester examination. In case of students who could not attend any of the sessional tests due to medical reason or under extraordinary circumstances, a separate test shall be conducted before the end semester examination with the permission of the Dean of school on recommendation of the Head of the Department.

C. The sessional tests will carry 40% of total marks for the course. The marks of the two sessional tests shall be taken into account for the computation of grades.

D. There shall be one end semester examination of 2 hours duration carrying 60% of marks in each course covering the entire syllabus prescribed for the course at the end of the semester only. The end semester examination shall be normally a written/laboratory based examination or presentation/seminar. The end semester examination and evaluation shall be conducted by the university.

4. **DETAILED SYLLABUS OF THE COURSE:**

4.1 **Paper 1st: Research Methodology:**

Ph.D./GEOL/ 104/Core course: 04 credits, 100 marks (60 Theory + 40 sessional)

Unit I: (A) Introduction: Objectives and significance of research, research methodology versus methodology. (B) Research and Scientific methods: Importance of research, research process, problems encountered by the researchers in India, journal reading techniques, defining research problems.

Unit II: Computer application and Statistical methods: Practical training, Laboratory techniques, computer and software application

Unit III: National and international status of the research problems selected by the candidate, Significance of report writing, precaution for writing a research report, techniques of oral presentation.

Unit V: Based on the above guidelines, the candidate will deliver at least two presentations/ seminars in front of departmental committee on his/her research topic and prepare the final synopsis in consultation with their supervisor.

4.2 Paper 2nd: Research and Publication Ethics & Elementary ideas of General Geology:

Ph.D./GEOL/102/Core course: 03 credits, 100 marks (60 Theory + 40 sessional)

Unit I: Research and Publication Ethics (RPE)- Course for awareness about the publication Ethics and publication misconducts. (2 Credit course -30 hrs.)

(Qualifications of faculty members of the course: Ph.D. in relevant subject areas having more than 10 years' of teaching experience)

Course Code: CPE- RPE

Overview: This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy: Class room teaching, guest lectures, group discussions and practical sessions

Evaluation: Continuous assessment will be done through tutorials, assignments, quizzes and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course structure: The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	30

Syllabus in detail:

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

- **RPE 02: SCIENTIFIC CONDUCT (5 hrs.)**

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS (7 hrs.)**

1. Publication ethics: definition, introduction and importance
2. Best practices/ standards setting initiatives & guidelines: COPE, WAME, etc.
3. Conflicts of interest
 4. Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types
5. Violation of publication ethics, authorship and contributor ship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING (4 hrs.)**

1. Open access publications and initiatives
 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
 4. Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- **RPE 05: PUBLICATION MISCONDUCT (4 hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.): Use of plagiarism software like Turnitin, Urkund and other open source software tools

- **RPE 06: DATABASES AND RESEARCH METRICS (7 hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

Unit II: Elementary ideas of General Geology including Structures and Geomorphology. (1 Credit course -15 hrs.)

4.3 Paper 3rd: Fundamentals of Geology:
Ph.D./GEOL/103/Elective course: 04 credits, 100 marks (60 Theory+ 40 sessional)

Unit I: Idea of X-ray crystallography, crystal optics, silicate structures.

Unit II: Concept, methods in mega and micro-palaeontology and stratigraphy.

Unit III: Crystallization of magma, petrological characteristics of igneous, sedimentary and metamorphic rocks; Ore genesis, Indian distribution and characteristics of ore deposits.

Unit IV: Application of geology with special reference to Himalaya; in engineering projects; Geo-hazards; impact of climate change on the Himalayan landforms and in Earth Processes.

4.4 Paper 4th: Elective Paper: (Student may opt any one paper from the following)
Ph.D./GEOL/104/Elective course: 04 credits, 100 marks (60 Theory+40 sessional)

Quaternary geology and geomorphology: evolution of landforms in the context of tectonics and climate, various techniques used in the study of quaternary records, understanding the quaternary deposits of India, elementary ideas about the modern techniques of geochronology.

Structure and Tectonics: Relationship between internal and external stress and the resultant strain feature in rocks including mathematical analysis analogue computer studies, geodynamics and deep earth processes, Himalayan tectonics.

Stratigraphy and Palaeontology: Stratigraphic sequence, depositional framework, general nature of Palaeontological problems; functional morphology analysis of biostratigraphy, SEM analysis, sequence stratigraphy and palaeomagnetism.

Advanced mineralogy: Laboratory aspects of RI determination, model analysis, reflectivity, micro hardness, cathode luminescence, chemical and X-ray analysis and their application in natural mineral system and assemblages.

Geochemistry: Modern work in pure and applied geochemistry including element distribution and migration in igneous, sedimentary and metamorphic rocks, hydrocarbon occurrence of organic studies.

Petrology: Modern work in pure and applied petrology, including recent development in research methodology and instrumentation concerning the investigation of crustal inorganic and /or organic material.

Sedimentology: Selected topic in deposition environments, tectonic control, diagenesis, and petrology of plastic and sedimentary deposits.

Metamorphism: Problems of regional metamorphism illustrated by Precambrian basement terrain and more recent orogenic belt, crustal evolution-pressure-temperature-time-deformation history of metamorphic belts. Review of experimental works in metamorphic mineral stability and recrystallization

Economic geology: Processes of ore formation, structural and stratigraphic control of mineralization, and tectonics, distribution of metallic and non-metallic ore deposits including coal and hydrocarbons, methods of surface and subsurface prospecting.

Geohydrology: hydrological properties of rocks, distribution, movement and occurrence of groundwater. Type of aquifers, modern methods of characterization of aquifers, water chemistry and its application in monitoring the ground water quality.

Environmental Geology: Current environmental issues viz. water, air, soil contamination/pollution-issues, causes, remedial measures. Geological hazards: seismicity, landslide, their causes and mitigation, landuse planning development, use of remote sensing and GIS in the preparation of hazard zonation maps.

Application of GIS and Remote sensing techniques: Training on the use of RS/GIS software viz. ARC GIS, Global mapper, ERDAS imagine etc, digital representation and analysis of vector and raster geographic data, topology and spatial relationship, techniques of digital terrain analysis, visualization of vector, and raster data, and basic cartographic techniques, geoprocessor.