

Applications for PhD positions in Department of Earth Sciences (DES), IISER Kolkata

Minimum eligibility criteria:

Applications are invited for the Doctor of Philosophy (PhD) program in the Department of Earth Sciences from candidates having either:

- 1) Master's degree with at least **55% aggregate marks** in Geology / Applied Geology / Geophysics / Earth Sciences / Marine geology / Environmental Sciences / Environmental Studies / Environmental Science and Engineering / Biotechnology / Atmospheric Science / Geographical Science / Agricultural Science / Forensic Science or any other branch of Geological Sciences. OR
- 2) Master's degree with at least **55% aggregate marks** in Physics / Chemistry / Mathematics / Biological Sciences / Computational Seismology and interested in pursuing research with the DES faculty member in the matching specialization. OR
- 3) 4-year BS with at least **75% aggregate marks** in any subject and interested to pursue research with the DES faculty member in the matching specialization.

A relaxation of **5%** marks may be allowed for those belonging to SC/ST/OBC (non-creamy layer), Differently-Abled, Economically Weaker Section (EWS) and other categories of candidates as per GoI norms. Candidates belonging to the respective reserved category need to submit relevant certificates and documents.

Interested candidates may apply through either of the two channels listed below

Channel 1: Externally funded category:

For candidates in the self-funded category, apart from satisfying minimal eligibility criteria, all candidates must have valid **CSIR-NET / UGC-NET JRF and other equivalent fellowships**. Candidates must have **physics, chemistry and mathematics at 10+2 level**, and **at least one of these subjects at their bachelor level**.

Channel 2: Institute (IISERK) funded category:

For candidates in the institute-funded category, apart from satisfying minimal eligibility criteria, all candidates must have qualified in one of the following examinations/categories, **GATE, UGC/CSIR NET (Category 2 & 3), IISER students with CGPA > 8, INSPIRE or other equivalent examinations**. Candidates must have **physics, chemistry and mathematics at 10+2 level**, and **at least one of these subjects at their bachelor level**.

Note: Individual research groups may have additional prerequisites, as specified in the detailed advertisement below. Applicants seeking a PhD in Environmental Sciences under Prof. Gopala Krishna Darbha need not have studied Mathematics at the 10+2 level.

A. The research areas in which the department is looking for young and bright minded externally funded (Channel 1) students only are listed below:

1. Paleontology - **Dr. Subhronil Mondal** is looking for motivated PhD candidates to work on diverse problems related to the evolutionary patterns and process of marine invertebrates across space and time.

For details, please check the lab webpage: <https://sites.google.com/site/subhronilindia/Home>

2. Structural Geology - **Dr. Kathakali Bhattacharyya** is looking for a bright and motivated, externally funded PhD student to understand mountain building processes by addressing manifestations of rock deformation at various scales and their implications. During tectonic processes, rocks deform through various progressive deformation stages to reach their finite deformed states. Deciphering these progressive deformation stages are challenging due to overprinting (and often obliteration) of incremental deformation stages. However, unravelling these kinematic stages are critical in understanding comprehensive rock deformation history and associated tectonics. The project examines how rocks accommodate deformation through space and time during mountain building processes. Multi-scale structural analysis will be employed to estimate geometric, kinematic and mechanical evolution of structures resulting from tectonic processes.

Requirements:

1. Bachelor's and master's degrees in Earth Sciences.
2. Master's thesis in Structural Geology
3. Experience in Structural Geology fieldwork.

3. Aerosol and Air Quality Research – The Aerosol and *Air Quality Research lab* led by **Dr. Debananda Roy**, is looking for bright and motivated candidates to work in the area of *Air Quality Management and Modelling*.

The research area will focus on “comprehensive investigation of indoor and outdoor air quality through monitoring, physicochemical characterization, source apportionment, and modelling of particulate matter and emerging pollutants (including microplastics, black carbon, bioaerosols, and transboundary contaminants), in order to assess their interactions and evaluate associated risks to human health and the environment”. The PhD candidates can choose to work on any of the following research areas:

Indoor and Outdoor Air Quality: Monitoring and physicochemical (organic and inorganic) characterization of particulate matter.

Emerging Air Pollutants: Identification and characterisation of airborne emerging pollutants (such as *microplastics and black carbon*), along with an assessment of their risks to human health and the environment.

Source Apportionment Study: Identification of the source of airborne particulate matter.

Air Pollution Modelling: Receptor (chemical mass balance- CMB8.2; positive matrix factorization), dispersion (AERMOD), and human health risk (exposure pathway and HRT mass deposition) modelling.

Air Quality in the Underground Transportation System: Air quality levels and associated human health risk levels for the commuters.

Bioaerosol Research: Monitoring, modelling, and quantitative microbial risk assessment (QMRA)- probability of infection and noncancer risk.

Natural and Transboundary Air Pollutants: Identification and quantification of natural and transboundary air pollutants and their impacts on human and the environment.

Interaction Study: Interaction phenomena between emerging pollutants and toxic air pollutants.

4. **Seismology** – **Prof. Kajaljyoti Borah** is looking for a bright and motivated PhD candidate to work on the ‘Evolution of the Bastar craton’ with the help of seismology. Archean cratons have been the prime targets of the scientific community for a long time because they store records of the long Earth’s history and they have economic significance as a major source of the World’s minerals. The crustal thickness, crustal composition (inferred from seismic wave velocities), structure and physical properties of crust-mantle transition (commonly used as Moho by the seismologists), and lithospheric discontinuities are the key parameters for understanding the formation and evolution of the cratonic lithosphere. This project is focussed at elucidating the origin and evolutionary history of the relatively unexplored Bastar craton along with other Archean cratons all over the globe by modelling the physical properties of the underlying crust and mantle using seismological data from these regions.

For more information about our research, please the following link: <https://www.iiserkol.ac.in/~kajal.borah/Research.html>

5. **Earth Surface Dynamics** - The Earth Surface Dynamics Group, led by **Dr. Sanjay Kumar Mandal**, focuses on quantitative Earth-surface processes that shape Earth’s surface and drive its evolution over geological timescales. Our research is motivated by a central question in the geosciences: how do tectonics, climate, and erosion interact as a coupled dynamical system, and what measurable signatures of that coupling are preserved in topography and the sedimentary record? We address this question using quantitative field measurements alongside geochemical and isotopic analyses, geospatial methods, and numerical modelling, with the Himalayan orogen as our principal field setting.

The Himalaya offers an exceptional opportunity to study these processes in an active, data-rich natural laboratory. Ongoing convergence between the Indian and Eurasian plates continues to drive crustal thickening and surface uplift, producing Earth's highest topography and one of its most dynamically evolving mountain belts. Monsoon-driven precipitation sustains intense erosion, generating sediment fluxes that are among the largest on the planet. The resulting material is transported through river networks and ultimately deposited in the foreland basin, where stratigraphic records preserve a detailed archive of orogenic and climatic history spanning tens of millions of years. This source-to-sink continuity, from actively deforming catchments to the foreland depocenter, makes the Himalayan system uniquely suited to quantifying rates, budgets, and timescales of erosion and sediment transfer and to linking these signals to tectonic and climatic forcing across a wide range of spatial and temporal scales.

Our current research is organised around three connected themes. (1) **Deformation and landscape evolution**: assessing how strain localisation, fault kinematics, and patterns of rock uplift govern orogenic topography and modulate erosional response. (2) **Terrestrial cosmogenic nuclides**: quantifying basin-averaged erosion rates, constraining sediment production and residence times, and estimating the pace at which landscapes adjust to tectonic and climatic perturbations. (3) **Sedimentary records and basin evolution**: integrating provenance analysis, stratigraphic synthesis, and basin-scale modelling to reconstruct the tectono-climatic evolution of Himalayan source-to-sink systems. Each theme can be pursued independently, but many of the most informative problems lie at their intersections; we therefore encourage doctoral projects that integrate approaches across themes. Prospective applicants are strongly encouraged to visit the group website (<https://esd-iiserkol.in/>) to explore our research in detail. We particularly welcome applicants with strong backgrounds in Geology/Geophysics or Physics, an interest in interdisciplinary field-based research, and the motivation to tackle quantitative Earth-surface questions using integrated field, laboratory, and modelling approaches.



ESD researchers mapping, measuring, and sampling fluvial deposits—turning outcrops into quantitative constraints on Earth-surface change.

6. Soil Science - Prof. Prasanta Sanyal is looking for motivated students to pursue research in soil science, with a focus on stable isotopes and organic molecular approaches. For details visit: www.iiserkol.ac.in/~silika .

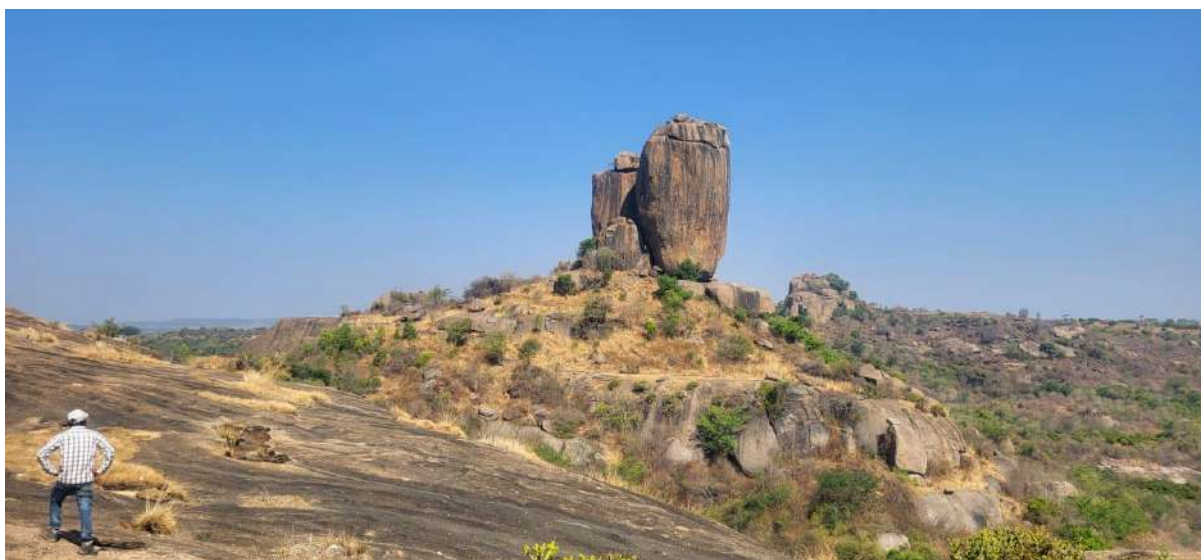
B. The research areas in which the department is looking for young and bright minded students through both the channels ([Channel 1: Externally funded](#) and [Channel 2: IISER Kolkata funded](#)) are listed below:

1. Luminescence Dating Laboratory – Prof. Manoj Kumar Jaiswal is looking for motivated candidates interested in pursuing PhD in the field of Remote Sensing and GIS. Selected students are supposed to work in landscape studies under the effect of climate and tectonics. The group is working in application of luminescence dating on the variety of landscape to understand changes in the past and their relationship with the climate and tectonics in late Quaternary. Students are supposed to learn and might have to work in development of luminescence dating towards application. He/she is supposed to go for field work independently in difficult terrain. Those having experience in working on landscape changes using GIS and remote sensing or in the field of Quaternary geology would be preferred

2. Crustal Evolution and Precambrian Geology - Prof. Sukanta Dey is looking for bright and motivated candidates to work on the following theme:

“How did continental crust form in Early Earth?”

The actual mechanism of continental crust formation in Early Earth (during the Archaean Eon) remains a significant research interest globally. Granite-greenstone belts provide vital clues to the mechanism and geodynamic setting of continental crust generation and related ore-deposit formation. Archaean rocks of diverse types are well exposed in the granite-greenstone belts of the cratonic blocks of India. This Ph.D. project aims to study the field, and age relationship and geochemistry of a few granite-greenstone belt rocks to understand their petrogenesis, role in crust formation and crust-mantle interaction, and to suggest a geodynamic model for Archaean crustal evolution. The project will provide an opportunity to the candidate to get involved in field mapping and detailed sampling in exotic terrains, followed by petro-mineralogical study, whole-rock geochemistry, and zircon U-Pb dating and Hf isotopic study. Candidates with a flair for fieldwork are encouraged to apply. Those with their own project ideas on early Earth crustal evolution are welcome to apply.



Geological fieldwork in Closepet Granite, Karnataka - exploring crust-mantle interaction 2.5 billion years ago.

For more information on our research:

<https://scholar.google.com/citations?user=eezQ3FwAAAAJ&hl=en>

3. Near-surface isotope and trace element geochemistry – Prof. Tarun K. Dalai is looking for bright and motivated PhD candidates.

Requirements: Bachelor's in Physics/Chemistry/Earth Sciences and Master's in the field of Earth Sciences.

The details about work and publications from our group is available at:

https://scholar.google.com/citations?user=89_ANY4AAAAJ&hl=en

The prospective candidate can work on any of the following research areas in our lab.

Areas of research

1. The fate of biospheric and petrogenic carbon in the river basins: This project would use proxies of biospheric carbon (i.e. $^{13}\text{C}/^{12}\text{C}$ ratios and ^{14}C) and petrogenic carbon ($^{13}\text{C}/^{12}\text{C}$ ratios and rhenium) of suspended and bed sediments in the rivers in India. The eventual goal is to assess the net effect on the atmospheric carbon due to CO_2 consumption via silicate weathering vs. the release of CO_2 via oxidation of biospheric and petrogenic carbon in the river basins.
2. Behaviour of elements and isotopes during weathering and transport: The primary goal of this project is to test the robustness of isotopes of neodymium ($^{143}\text{Nd}/^{144}\text{Nd}$), lithium ($^7\text{Li}/^6\text{Li}$), strontium ($^{87}\text{Sr}/^{86}\text{Sr}$) as proxies of silicate weathering. We will use these isotopes and selected group of trace elements in our investigations.

3. The study of relative mobility of redox-sensitive elements (e.g., Mo, V, U) during weathering and transport. Understanding of cycling of these elements has implications for fractionation of their isotopes, contaminant transport and their utility as proxies for paleo-redox conditions.
4. Partitioning and geochemical behaviour of rhenium during weathering and surficial transport, and tracing anthropogenic rhenium contributions to rivers, estuaries, lakes and coastal ocean.
5. Understanding behaviour and fractionation of rare earth elements (REEs) during basalt weathering.

4. Environmental Sciences - Prof. Gopala Krishna Darbha leads the Environmental Nanoscience and Hydrogeochemistry Group in the Department of Earth Sciences at IISER Kolkata. The group conducts interdisciplinary research at the interface of environmental geochemistry, nanoscience, and hydrological processes.

The overarching goal of the group is to understand the sources, transport, transformation, and remediation of emerging and conventional pollutants in natural systems. The major research thrust areas include:

1. **Assessment of pollutant distribution across environmental compartments** (air, water, soil, and food systems), with particular emphasis on identifying and quantifying human exposure pathways.
2. **Environmental health:** The candidate is expected to contribute to collaborative research between IISER Kolkata (IISERK) and AIIMS Kalyani, focusing on **human exposure pathways and health implications of environmental pollutants**, including heavy metals, microplastics, and emerging organic contaminants. The research will investigate the **association between urinary microplastics and cognitive function in individuals with Cannabis Use Disorder**, as well as the accumulation, distribution, and potential translocation of micro- and submicron-sized plastic particles and heavy metals in human lungs and other organs. Particular emphasis will be placed on understanding their **toxicological effects, biological interactions, and associated adverse health outcomes**, integrating environmental exposure assessment with human health and risk interpretation.
3. **Hydrogeochemical controls on metal transport** within river basins, sediments and soils, focusing on mobilization, speciation, and long and short-range dispersal of toxic elements.
4. **Distribution, transformation, and fate of micro- and nanoplastics** in Indian rivers and coastal environments, including their interactions with natural colloids and biogeochemical processes.
5. **Application of remote sensing and geospatial tools** to address large-scale environmental monitoring and pollution mapping challenges.

6. **Development of eco-friendly remediation materials** derived from industrial and agricultural waste for the removal of potentially toxic elements (e.g., chromium, lead, arsenic) and organic contaminants such as nanoplastics, dyes, perfluoroalkyl substances, and pesticides.
7. **Critical mineral recovery from mine waste**, employing integrated biological and chemical approaches to promote sustainable resource recovery and circular economy principles.

Through a combination of field investigations, advanced analytical techniques, laboratory experimentation, and modelling approaches, the group contributes to both fundamental understanding and applied solutions for environmental sustainability. Interested candidates with Chemistry, Biology, Marine, Geology and Engineering disciplines are highly encouraged to apply.

For recent publications, achievements, and ongoing projects, please visit: <https://gkdarbha.wixsite.com/gopaladarbha>

5. Computational Mineral Physics – Led by **Dr. Swastika Chatterjee**, the group seeks bright, motivated candidates interested in using first-principles computational methods to investigate deep-Earth processes (extending to the core) and planetary phenomena. These methods reliably determine the physical and chemical properties of minerals under ambient and extreme pressure-temperature conditions and become particularly indispensable under situations where in-situ observations or laboratory experiments are difficult to conduct.

For recent publications see:

<https://scholar.google.com/citations?user=XcACOYMAAAAJ&hl=en>.

You may also visit our group webpage: <https://www.iiserkol.ac.in/~cmp/>

DES Spring 2027 PhD Timeline:

- PhD application portal opens: **20.09.2026**
- Application portal closes: **25.10.2026**
- Publication of shortlist for the Interview: **31.10.2026**
- Selection Interview window: **09.11.2026 to 22.11.2026**
- Publication of PhD interview results by: **27.11.2026**
- Pre-registration portal opens: **30.11.2026**
- Registration for Spring Semester 2027: **30.12.2026**