# 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) Masters degree with at least **55% aggregate marks** in Geology / Applied Geology / Geophysics / Earth Sciences / Marine geology / Environmental Sciences / Environmental Studies / Atmospheric Science / Geographical Science / Agricultural Science or any other branch of Geological sciences. OR

2) Masters degree with at least **55% aggregate marks** in Physics / Chemistry / Mathematics / Biological Sciences / Computational Seismology and interested to pursue 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.

Final year MS/BS students who are yet to obtain their degree may also apply; however, they must have completed their respective degree at the time of admission.

**Interested candidates may apply though 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 JRF / UGC-NET JRF / DST-INSPIRE / other equivalent fellowship.** 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, **GATE, UGC/CSIR NET (Category 2 & 3), 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**.

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

**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

**The research areas in which 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-**

**Solid Earth Studies -** *Prof. Supriyo Mitra (in collaboration with Dr. Tapabrato Sarkar)* is looking for a bright and motivated candidate to work on 'Structure and evolution of the cratonic lithosphere: Seismological and Petrological Models'

**Earth Surface Dynamics -** The Earth Surface Dynamics (ESD) group, led by *Dr. Sanjay Kumar Mandal*, investigates the diverse processes that collectively shape the Earth's surface geology. The group's research focuses on studying tectonic processes that deform the near-surface, as well as climate-driven erosional processes that sculpt the surface, forming the topography and producing sediment. The Himalaya serve as an example of this interconnected system, where orogenic processes driven by the ongoing collision between continental plates have elevated the high mountains, which erode rapidly under the influence of monsoon climate. This process generates sediments deposited in river valleys, intermontane basins, Indo-Gangetic foreland basin, and ultimately in the Bengal and Indus fans. These sedimentary records chronicle the orogenic evolution of the Himalaya.

The Earth Surface Dynamics group is interested in the processes of continental collision, tectonic mountain building, erosion, sediment production, and transport within the Himalayan system. The researchers employ a variety of techniques to study this system, including fieldwork, geochemical and isotopic analysis, cosmogenic nuclide analysis, GIS, remote sensing, and computer modeling. Fieldwork is an essential component of their research.

PhD students will have the opportunity to design and conduct research in one or more of the following broad areas: Tectonics and Landscape Evolution, Cosmogenic Nuclides, and Sedimentology. For more details, please visit the ESD group website: https://esd-iiserkol.in/.

**Near-surface isotope and trace element geochemistry -** *Prof. Tarun Kumar Dalai* is interested in prospective candidates to work on any of the following research areas.

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. stable ($^{13}C/^{12}C$) and radio ($^{14}C$) carbon) and petrogenic carbon (rhenium) of suspended and bed sediments in the rivers of Eastern 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 ($^{143}Nd/^{144}Nd$), lithium ($^{7}Li/^{6}Li$), strontium ($^{87}Sr/^{86}Sr$) as proxies of silicate weathering. We will use these isotopes and a suite of major and trace elements in basaltic and granitic weathering profiles for investigation.
3. History and magnitude of anthropogenic contamination of lacustrine and estuarine environments: Tracers that would be employed are heavy metals, rhenium and lead (Pb) isotopes.
4. Geochemical behaviour of redox-sensitive elements (Re, Mo, V, U) during weathering and transport and implications to use of these elements as proxies of modern and past redox conditions.
5. Any other areas of mutual interest based on discussions with prospective candidates.

**Preferred requirements:** Bachelor and master degrees of the candidate should be in the field of earth sciences.

**Seismology-** *Dr. Kajaljyoti Borah* is looking for a bright and motivated PhD candidate to work on two different themes:

Channel 1: Externally funded category:

**'Evolution of Archean cratons: insight from Bastar craton'**. 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 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.

Channel 2: Institute (IISERK) funded category:

**'3D- shear velocity anisotropic structure in the Indo Burma Ranges and its geodynamic implication'.** Imaging 3-D shear velocity structure beneath Indo-Burma ranges and the adjoining regions by modeling receiver functions, surface wave data extracted from earthquake and ambient noise to unravel the deep structure across diverse geological terranes. Azimuthal anisotropy estimation from splitting analysis of teleseismic core-refracted phases, which can be used to decipher crust-mantle flow and mantle deformation patterns around the subducting slab.

**Structural Geology:** *Dr. Kathakali Bhattacharyya* is looking for a bright and motivated PhD students to address manifestations of rock deformation processes at various scales and their implications.

Deformed rocks record their progressive deformation paths which is challenging to decipher due to overprinting (and often obliteration) of incremental deformation stages. 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.
**Preferred requirements:** Bachelor and Master degrees of the candidate should be in the field of earth sciences and experience in structural geology fieldwork.

### DES Autumn 2025 PhD Timeline:

- PhD application portal opens: **09.03.2025**
- Application portal closes: **19.05.2025**
- Publication of shortlist for the Interview: **26.05.2025**
- Selection Interview window: **9.06.25- 20.06.25**
- Publication of PhD interview results by: **26.06.2025**
- Pre-registration portal opens: **26.06.2025**
- Pre-registration deadline: **28.07.2025**