About us:
The Indian Institute of Technology Kanpur created a new Department of Earth Sciences in February 2014 with the aim of establishing an interdisciplinary Earth Sciences teaching and research program of contemporary relevance.

Objectives:
Integration of quantitative approaches and techniques across various earth systems and application of geological, geophysical and other related analytical methods. Training students and developing an aptitude for conjunctive use of field, experimental, analytical and numerical approaches. Providing high-quality industry and research-oriented manpower in various fields of Earth Sciences.
Academic programs and Specializations

BS-MS in Earth Sciences

1) Geology :
- Geology of Fuels, Structural Geology, Sedimentary Processes and Stratigraphic Principles, Hydrology, Engineering Geology, Economic Geology

2) Geophysics :
- Fundamentals of Geophysics, Exploration seismology, Geophysical methods, Potential Field Theory and application, Well logging, Remote sensing

3) Solid Earth studies :
- Earthquake seismology, Petrology, Rock Mechanics, Geochemistry, Geodynamics

4) Natural Hazards :
- Tectonic Geomorphology, Flood risk and mitigation, Disaster management

5) Elective courses:
- Advanced courses of PG level offered by Department, Open Electives by Institute

M. Tech Geological Technology

1) Compulsory courses :

2) Elective courses :
- Geochemistry and Geology of Petroleum, Solid Earth Geophysics, Advanced Structural Geology, Experimental Rock Deformation and Rock Physics, Applied Sedimentology and Basin Analysis, Natural Hazards
Schlumberger activities with the department

- The world’s largest oilfield service provider company “Schlumberger” has been associated with Earth Sciences department at IIT Kanpur from 2017.
- Schlumberger day has been celebrated on 3rd - 4th October, 2018 where technical events like:
  - Case studies
  - Poster presentation etc., were conducted.
- Since then mutual sharing of knowledge between the institute and the company has been entrenched.

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The department is now looking towards spreading roots and establish a promising relation with major oil and gas companies.
**Geophysics projects: Dr. Dibakar Ghosal**
- Estimation of petrophysical properties of hydrocarbon bearing reservoirs using FAVO analysis (₹47.00 Lakhs)
- Modelling of Gas hydrate reservoir using integrated techniques (₹66.00 Lakhs)

**Geochemistry: Dr. Indra Sekhar Sen**
- Organometallic fingerprinting proxy to locate shale oil pools, Pan-IIT ONGC consortium (₹66.00 Lakhs)

**Structural Geology: Dr. Santanu Misra**
- Enhanced Coal-Bed-Methane and Shale-Gas recovery from underground reservoirs aided by permeability enhancement and CO₂ sequestration - an experimental approach. (₹3.17 Crore)
Research Areas

Hydrocarbon Studies:
- Seismic studies on:
  - Gas hydrate reservoirs
  - Poro-elasticity
  - Refraction Tomography
  - Full Waveform Inversion
- Application and development of new inorganic tools in hydrocarbon exploration

Structural studies:
- Enhanced Coal-Bed-Methane and Shale-Gas recovery from underground reservoirs aided by permeability enhancement and CO2 sequestration - an experimental approach
- Characterization of the frictional properties and seismic-aseismic transitions in active faults of the Himalaya: an experimental investigation
Groundwater Structure and Dynamics

- Geomorphic controls on ground water aquifers-integrated approach using borehole data and modelling
- Forecasting the response of the ground water system to plausible future changes in the water cycle
- Modelling ground water flow dynamics under varying stresses-historical water level data analysis, isotopic methods for source characterization and recharge estimation; ground water modelling

And also some major studies on:
- Potential field methods
- Integrated geophysical research
- Mineral exploration and near surface studies
- Tectonic studies
- Geophysical data processing/enhancement
- Modeling and joint inversion
Other research areas

Natural Hazards:
- Landslides and slope stability
- River flood risk assessment

Paleo-seismology and Paleo-tsunami study:
- GPS measurement-crustal deformation studies in NW Himalaya
- Paleo-tsunami investigation in Andaman & Nicobar islands

Paleoclimate Reconstruction:
- Paleo climate reconstruction using sedimentary archives

Planetary Studies:
- Aspects related to composition, texture and surface morphology on the Moon and its plume Enceladus

River Sciences:
- Human transformations of river system-impact of LULC, anthropogenic interventions and overexploitation on river forms and processes
- Geomorphic features of active tectonics-geomorphic indices, morphometric analysis, Remote sensing and GIS methods

Environmental Sciences:
- Environmental flow and river health assessment

Geochemical Studies:
- Impact of aerosols and Aeolian dust, sea salt spray, soil erosion and volcanic emissions on chemical fluxes on Earth's surface
- Implication for crustal evolution, heat flow and Open system geochemical evolution models
Geophysics lab
- Well Logger
- Seismic Thumper
- Geophones (RAU)
- High Performance Workstation
- Gravitimeter
- Magnetometer
- Very Low Frequency
- VES

Other Useful terrain mapping tools such as
- Total station
- DGPS
- UAV
- GPR

Rock Mechanics Lab
- Rock core Drill Machine
- Vacuum Oven
- Pulveriser
- Low speed diamond Saw
- Automatic Rock curring Polishing
- Uniaxial Rock Machine
- Lathe Machine
- Hydraulic Press
- Hydraulic Hot Mountain Press
- Lapping Machine
Sedimentology & Microscopy
Facilities
- Sedigraph
- XRD
- Sieve shaker
- OSL Reader
- Isodynamic Magnetic separator
- Ultra-Thin Section bench Top
- SEM
- Vibratory Cup mill
- Vacuum Impregnation Unit
- Thin Section Preparation Unit
- UIC coulometer
- Leica Optical Microscope
- Stereo Zoom Microscope (SMZ 1000)
- Cathode Luminescence Microscope

Analytical facilities
- XRF
- Q-ICPMS
- IRMS
- Aerosol Sampler
- Hydraulic Press pellet
- F- AAS
- Core Archival and Analysis Facility
- Core Scanner (DCS)
- Metal- Free clean lab
- Bartington Magnetic Susceptibility Meter- dual Frequency
- Laser Water Isotope Analyzer
- Nutrient Analyzer
Synergy with other Departments

Material Science & Engg.
Minerals, Material characterization

Mechanical Engineering
Geomechanics and computational seismology

Civil Engineering
Hydrology, Fluid dynamics, River Science, Environment

IME, Design
Energy, Innovation

Humanities
Environmental Economics, Energy Economics, Econometric methods

Mathematics and Statistics
Data structure, Statistics modeling

Chemistry
Physical chemistry, Environmental Chemistry, Biochemistry, Ancient life on earth

Physics
Atmospheric Processes, Energy, Fluid flow, Earth's Magnetism
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