



**NATIONAL INSTITUTE OF SCIENCE EDUCATION AND RESEARCH  
BHUBANESWAR**

**Advt. No: NISER/ACAD/Ph.D /2023-24 (1)**

**Date: 3<sup>rd</sup> April, 2023**

**Notice for Admission to Ph.D Program: 2023-24 (Summer Session)**

Online applications are invited from Indian citizens for admission to Ph.D program scheduled to commence from August, 2023 in the following schools of NISER, Bhubaneswar.

- 1. School of Biological Sciences (SBS)**
- 2. School of Chemical Sciences (SCS)**
- 3. School of Computer Sciences (SCPS)**
- 4. School of Earth & Planetary Sciences (SEPS)**
- 5. School of Humanities and Social Sciences (SHSS)**
- 6. School of Mathematical Sciences (SMS)**
- 7. School of Physical Sciences (SPS)**

**1. Eligibility**

<b>School</b>	<b>Minimum Educational Qualifications #</b>
<b>Biological Sciences</b>	60% or equivalent GPA in Masters or M. Tech or M. Pharm in any branches of Agricultural Sciences, Biology, Life Sciences, Pharmacy (any specialization), Veterinary Sciences, Computer Sciences, Bioinformatics and Biotechnology. Students with Master's degree in Physics, Chemistry or Mathematics having interest in pursuing a career in Biology are also encouraged to apply. Candidates with a 4 year / 8 semester Bachelor's degree program with a minimum of 75% marks in aggregate or equivalent grade are also eligible to apply for the program.
<b>Chemical Sciences</b>	60% or equivalent GPA in Masters in Chemistry or allied Chemistry fields. Student with Master's degree in any branches of Basic Sciences with undergraduate degree in Chemistry (or chemistry as one of the subjects) or M.Tech in applied Chemistry or Computer Sciences with interest in pursuing a career in Chemistry are also encouraged to apply. Candidates with a 4 year / 8 semester Bachelor's degree program with chemistry as major subject with a minimum of 75% marks in aggregate or equivalent grade are also eligible to apply for the program.
<b>Computer Sciences</b>	60% or equivalent GPA in Masters in Mathematics or Masters in Computer Science, or M.Tech or M.E. in Computer Science/Electronics/Electrical Engineering or related fields. Candidates with a 4 year / 8 semester Bachelor's degree program with a minimum of 75% marks in aggregate or equivalent grade are also eligible to apply for the program.

<b>Earth &amp; Planetary Sciences</b>	60% or equivalent GPA in Masters or M.Tech or M.E in Physics/Astronomy and Astrophysics /Geology/ Geophysics/ Earth Science / Chemistry /Space / Atmospheric and Oceanic Sciences / Engineering Physics/ Mechanical engineering / Civil engineering / Computer engineering. In addition to the above criteria, candidates with M.Sc. degrees should possess a mathematical, physical or chemical science based Bachelor's degree. Candidates with a 4 year / 8 semester Bachelor's degree program in Mechanical engineering/Civil engineering/Engineering physics/Computer engineering with a minimum of 75% marks in aggregate or equivalent grade are also eligible to apply for the program.
<b>Humanities and Social Sciences</b>	55% or equivalent GPA in Masters in Social Sciences or in allied disciplines.
<b>Mathematical Sciences</b>	60% or equivalent GPA in Master's degree examination. Candidates with a 4 year / 8 semester Bachelor's degree program with a minimum of 75% marks in aggregate or equivalent grade are also eligible to apply for the program.
<b>Physical Sciences</b>	60% or equivalent GPA in Masters in Physics or M.E / M.Tech in Applied Physics. Candidates with a minimum 75% marks in aggregate or its equivalent grade in a 4 year / 8 semester Bachelor's degree science program with physics as one of the subjects or in a 4 year B.E/B.Tech degree program are also eligible to apply for the program.

# Candidates who are appearing in the final semester/year of qualifying examination in 2023 are also eligible to apply. However, if selected, their admission will be subject to submission of final semester / year result mark sheet wherein they should have obtained the requisite percentage or equivalent grade.

## 2. Requirement of Qualifying in National Level Examinations for pursuing Ph.D program

**School of Biological Sciences** - Candidates should have qualified at least one of the National Level Examinations i.e. CSIR-UGC-NET (LS or JRF) /GATE/JEST/GPAT/DBT/ICMR/JGEEBILS or any other equivalent national level examination valid for the academic year August 2023-July 2024.

**School of Chemical Sciences** - Candidates should have qualified at least one of these National Level Examinations i.e. CSIR-UGC NET (LS or JRF)/GATE valid for the academic year August 2023-July 2024.

**School of Computer Sciences** – Candidates should have qualified at least one of these National Level Examinations i.e. CSIR-UGC-NET (JRF)/GATE/JEST valid for the academic year August 2023-July 2024.

**School of Earth and Planetary Sciences** – Candidates should have qualified at least one of these National Level Examinations i.e. CSIR-UGC-NET (LS or JRF) /GATE/JEST valid for the academic year August 2023-July 2024.

**School of Humanities & Social Sciences** – Candidates should have qualified at least one of the National Level Examinations i.e. UGC-NET (LS or JRF) / GATE (Humanities and Social Science)/ICSSR fellowship or any other equivalent national level examination valid for the academic year August 2023- July 2024.

**School of Mathematical Sciences** - Candidates should have qualified at least one of these National Level Examinations in ***Mathematical Sciences*** i.e. CSIR-UGC-NET (JRF only) /GATE/NBHM\*or any other equivalent national level examination valid for the academic year August 2023-July 2024.

\*A student will be considered to be qualified in National Level Written Examination conducted by NBHM if he/she has received call letter from NBHM to appear in the interview for PhD fellowship 2023 (irrespective of getting selected for NBHM PhD fellowship 2023 or not).

**School of Physical Sciences** – Candidates should have qualified at least one of these National Level Examinations i.e. CSIR-UGC-NET (JRF only)/GATE/JEST valid for the academic year August 2023- July 2024.

**Important Note:**

(a)The cut off marks for national examination such as GATE/JEST/GPAT/NBHM/JGEEBILS/CSIR-UGC-NET etc. will be further decided by each School for the relevant subject area.

(b)As per HBNI Ordinance, student having INSPIRE Doctoral Fellowship ONLY, without qualifying any of the above mentioned national level written examination will NOT be considered for admission to Ph.D program in NISER.

(c) Candidates with GPA in qualifying degree may need to produce the conversion note (in case it is not mentioned in their mark sheet) from their institution towards calculation of percentage.

**3. Fellowship**

1. The institute fellowship given by NISER is Rs 31,000/- for first two years, which will subsequently be enhanced to Rs 35,000/- for remaining three years, subject to the condition that he/she fulfills all the requirements of the Institute that will be stipulated from time to time.
2. Students with external fellowship from agencies viz. CSIR, UGC etc. will be eligible to draw fellowship as per the extant rules of the respective funding agencies.

**4. Research Areas for some Schools**

**School of Biological Sciences**

- Mechanism of Nuclear Expansion-Structure function of nuclear dynamin protein 6. Regulation of biogenesis and morphology of endoplasmic reticulum (Dr. Abdur Rahaman)
- Evolutionary origins, systematics, Biogeography, Phylogeography and speciation patterns of South Asian biota (Dr. Aniruddha Datta Roy, BIOGEOSYS Lab)
- Design, evaluation and development of cancer therapeutics (Dr. Badireenath V. Konkimalla)
- Regulation of lysosomal pH by TRP ion channels and its effect on immune system (Dr. Chandan Goswami)
- Molecular genetics and epigenetics of Ageing disorders: Neurodegeneration and Cancer (Dr. Debasmita P. Alone)
- Role of bacterial cell membranes in antibiotic resistance. Mechanism underlying bacterial persistence. (Dr. Harapriya Mohapatra, Molecular Medical Bacteriology Lab)
- Cancer Biology: Tumor microenvironment. (Dr. Manjusha Dixit)

- Mucosal Immunity and host-microbe interactions to improve health using cutting edge high-throughput techniques.  
Role of gut-adipose-brain axis in metabolic and neuronal diseases. (Prof. Palok Aich)
- Molecular mechanisms of eukaryotic start codon selection and regulation (Dr. Pankaj V. Alone)
- Neuroscience: Neural circuits, Behaviour and Neuroendocrine regulation. Neuropeptide and dopaminergic control of energy balance (Dr. Praful S. Singru)
- Regulation of collective behaviour in bacteria by cell division.  
Cryo-EM and Structural Biology of the mitotic apparatus in bacteria.  
Screening of antibacterials targeting bacterial cytoskeleton (Dr. Ramanujam Srinivasan)
- Evolution of host-gut microbiome interaction and its impact on host reproductive ecology.  
Evolution of acoustic signaling in orthopterans shaped by habitat, intra and interspecies interactions (Dr. Rittik Deb)
- Protein Engineering and Structure-Function-Dynamics studies on polysaccharide lyase.
- De novo design of transmembrane helical bundles: From structure to function (Dr. Rudresh Acharya)
- Mechanism of host cellular membrane manipulation by Mycobacterial secretory components (Dr. Saleem Mohammed)
- Cellular Immunology associated to Infection Immunity, Cancer Immunity and Immune Regulation ( Dr. Subhasis Chattopadhyay)
- Structural biology of viral cell-entry proteins (Dr. Tirumala Kumar Chowdary)

For detailed information on research areas, please visit:  
<https://www.niser.ac.in/sbs/page/faculty-and-area-research>.

### **School of Chemical Sciences**

For detailed information on research areas, please visit:  
<https://www.niser.ac.in/scs/content/faculty>.

### **School of Computer Sciences**

Broadly in the following areas.

- \* Parameterized Algorithms
- \* Randomized Algorithms
- \* Sublinear Algorithms
- \* Machine Learning
- \* Secure Multiparty Computation
- \* Computational Geometry

For detailed information on research areas, please visit the webpage  
<https://www.niser.ac.in/scps/faculty-list>.

### **School of Earth and Planetary Sciences**

1. **Stars and Planetary Systems Group:** Physics of the formation of exoplanets; Observing the (exo)planet-forming disks around young stars using mm/sub-mm/infrared telescopes (e.g., ALMA, NASA's JWST); Understanding the diversity of exoplanetary atmospheres using 1D, 2D and 3D modeling frameworks; Characterizing the atmospheres of exoplanets using space-based (e.g. JWST) and ground-based (e.g. ARIES 3.6m, GIANO, CARMENES) telescopes [Dr. Liton Majumdar, (<http://www.niser.ac.in/~liton/>)]
2. **Petrology and Geodynamics Group:** Using field geology, petrology, geochemistry and geodynamic modeling to: (a) decipher the mechanisms of Archean continental crust

- formation; (b) constraining Archean geodynamics; & (c) constrain the controls of solid Earth processes on the evolution of atmospheric-ocean chemistry in deep time. [Dr. Priyadarshi Chowdhury( <https://www.niser.ac.in/users/priyadarshi>).
3. **Meteorite Studies and Cosmochemistry Group:** (a) Study of nanometer scale structure and isotope composition of rare refractory and presolar grains in meteorites to understand the physical and chemical conditions in the early solar protoplanetary disc and nucleosynthesis processes in stellar interiors. The study involves the use of advanced electron microscopy (FIB and TEM) and mass spectrometry techniques (NanoSIMS, RIMS). (b) Understanding the evolution of organic-rich C-type asteroids through study of nanometer scale structure and isotope composition (C, N) of CM chondrites. [Dr. Surya Snata Rout's Laboratory]
  4. **Earthquakes and Crustal Deformation Group:** We will be looking for highly motivated students with background in computational mechanics/structural geology/geophysics/physics to work on: (a) understanding the physical processes controlling variable frictional strength of geomaterials and their role in governing fault slip, (b) understanding earthquake cycles within geometrically complex fault zones, (c) developing physics-based models of landslides for use in early warning. [Dr. Pathikrit Bhattacharya, <https://www.niser.ac.in/users/pathikritb>]
  5. **Regional climatology:** (1) Observational and modeling studies of convective processes in the Himalayas. Project would involve making in situ observations of surface fluxes in Himalayan forests. The student will use these observations in conjunction with high resolution atmospheric modeling to study the role of vegetation in convective triggering in high terrain. (2) Theoretical studies of tropical climate dynamics pertaining to regional heat stress. Project would involve understanding the role of large scale tropical atmospheric dynamics in constraining heat stress in regions close to the ITCZ. The student would work in an idealized modeling framework to understand these relationships. [Dr. Jaya Khanna, <https://www.niser.ac.in/seps/professor/jkhanna>]
  6. **Planetary surface mineral physical chemistry:** (1) Max Planck India Partner Group project in collaboration with MPS/Germany and others in US/Canada: Work on NASA Dawn VIR hyperspectral data calibration (estimating emissivity and temperature considering surface roughness, and then normalization of illumination geometry using radiative transfer approach); Science objective is study of 3.1  $\mu\text{m}$  feature and to understand the origin and formation of asteroid Ceres either in the inner or outer solar system; Unique opportunity to visit collaborators in Germany/US/Canada. (2) ISRO project on Chandrayaan-2: Work on IIRS hyperspectral data calibration (estimating emissivity and temperature considering surface roughness, and normalization of illumination geometry using radiative transfer approach); Science objective is study of composition in the South Pole Aitken basin and to understand the mineralogy either of mantle or crustal origin. (3) Venus surface physical and chemical characterization using inflight data (with atmospheric and surface thermal/photometry corrections). (4) Study of minerals at atomic and molecular level using FTIR, XRD, Raman, SEM/EDS spectroscopy. (5) Comparative study of mineral exploration prospects of Indian cratons in global context [Dr. [Guneshwar Thangjam](https://www.niser.ac.in/users/thangjam), <https://www.niser.ac.in/users/thangjam>]
  7. **Planetary Atmospheres Group:** We are looking for enthusiastic and motivated students interested in characterizing exoplanet/solar-system atmospheres and understanding their origin and evolution, along with the various physical and chemical processes in these planetary atmospheres. This project includes 1) Developing and/or applying atmospheric models (forward and retrieval) to interpret their observations from telescopes like HST, VLT, JWST and solar system spacecrafts 2) Terrestrial planet modeling for habitability/bio-signature detection with future telescopes 3) Developing and/or using reduction pipelines to process raw data for exoplanet transit spectroscopy observations from HST, JWST and ground based

ARIES 3.6 m Devasthal optical telescope. [Dr. Jayesh Goyal's Lab  
<https://www.niser.ac.in/~jgoyal/> ]

For detailed information on research areas, please visit the webpage:  
<http://www.niser.ac.in/seps/page/faculty>.

### **School of Humanities and Social Sciences**

**English** - Representations of Science and Technology in Literature.


**Sociology** - Tourism System, Social aspects of Information and Communication Technology, Society-Science Interface, Human-wildlife conflict, Energy and Policy, Disaster mitigation and management.

### **School of Mathematical Sciences**

Algebra, Algebraic Geometry, Algebraic Graph Theory, Cryptography, Differential Equations, Differential Geometry, Discrete Mathematics, Functional Analysis, Harmonic Analysis, Incidence Geometry, Number Theory, Probability Theory, Representation Theory.

For detailed information on research areas, please visit the webpage:  
<http://www.niser.ac.in/sms/professors>

### **School of Physical Sciences**

- **Condensed Matter Theory:**  Strongly correlated electron systems and many body theory, Study of the entanglement content of ground states of quantum magnets, Computational approaches to lattice models, Dirac and Weyl Physics in Topological Insulators and Graphene, Topological superconductivity, Study of strong correlations in Ultracold Bosons, Multiscale Material Modelling Simulations within ab initio electronics structure and model Hamiltonian, Electronic Structure Theory, Theoretical nanoscale science, Quantum information theory
- **Statistical Mechanics and Soft Matter:** Disordered complex systems, non-equilibrium statistical mechanics, active matter, polymers, colloids, stochastic processes in biology, Statistical mechanics and game theory
- **Condensed Matter Experiment:** Domain wall dynamics, Skyrmionics & Topotronics, Spin pumping and Inverse Spin Hall effect, Organic Spintronics, Compensated/Antiferromagnetic spintronics, Anomalous and topological Hall effect in non-trivial magnets, spin dynamics via ferromagnetic resonance, magnon-magnon coupling, ferrimagnetic spintronics and synthetic antiferromagnets, Spin triplet supercurrent generation, Induced superconductivity in confined Geometry, Josephson Junction physics, Ion beam based Nanomaterials Research, Nanophotonics/Plasmonics, Semiconductor Device Physics, Medical Diagnostic Devices, Ultrafast dynamics, Nonlinear and Time-resolved terahertz spectroscopy, Quantum Optics and Cold Atom Research, Coherent Rydberg Excitation in Atomic Vapor, Nonlinear Optics and Lasers. Optical Parametric Oscillators and Amplifiers, Perovskite Photovoltaics, Thermoelectric Devices, Molecular memory, Neuromorphic Computing, Field effect transistors.
- **High Energy Theory:** Relativistic dissipative fluid dynamics, Physics of heavy ion collisions, quark gluon plasma and QCD matter, Study of Hot and dense nuclear matter, Finite temperature field theory, Numerical relativistic hydrodynamics and magneto hydrodynamics, Lattice QCD, Perturbative QCD, Scattering amplitude, resummation, Black Holes, String Theory, Fluid-Gravity correspondence, and flat space holography.

- **High Energy Experiment:** Quantum Chromo dynamic (QCD) phase diagram, properties of QCD matter and various signatures of Quark Gluon Plasma with experiments at RHIC and LHC, Dark Matter Search in SuperCDMS experiment at SNOLAB, experiments related to coherent elastic scattering of neutrino with nucleus, R&D in detectors for high energy physics experiments at LHC and EIC, CP violation, Study of Higgs, Top quark, Flavour physics and search for long lived particles, Dark photons, SuSY particles with CMS experiment; Study of neutrino oscillation, Magnetic monopole and light dark matter search, Neutrino magnetic moment, Cosmic muon properties using NOVA neutrino experiment.
- **Cosmology and Astrophysics:** Observational Cosmology, Epoch of reionization, Galaxy formation and evolution, N-body simulations, CMB observations, dust polarization, primordial gravitational waves, starlight polarization, stellar interactions, galactic magnetic fields, hydrodynamic and magnetohydrodynamic simulations.

## 5. Selection Procedure

- The selection committee of the respective schools will short-list the candidates among those who meet the minimum educational qualifications as mentioned at S.No 1 & 2 and satisfy additional criteria which each school may set as deemed necessary.
- The short-listed candidates will be called for an interview, supplemented by a written test, if necessary, for admission.
- Based on the academic record and the performance of the candidates in the selection process, the selection committee of the school will recommend candidates to the Chairman, Academic Council for admission to the Ph.D. program.
- All candidates called for the Test / Interview will be paid to and fro single, second-sleeper class railway fare by the shortest route from their place of residence to the Institute. They have to produce evidence (railway ticket) in support of their claim.

## 6. How to Apply

- The application form has to be filled up online at <http://www.niser.ac.in> and candidates should follow stepwise instructions mentioned to complete the application submission process. At the time of application, along with this online form, the candidate should upload soft copy of the supporting documents as per the eligibility criteria.
- Candidates intending to apply for more than one school should fill up separate online application forms for each school with appropriate supporting documents.
- NISER does not demand any application fee from the candidates who apply for Ph.D program.

## 7. Important dates

- Online application portal will be activated on - 3<sup>rd</sup> April, 2023
- Last date for filling up online application - 30<sup>th</sup> April, 2023
- Short-listed candidates list will be uploaded on - 5<sup>th</sup>-16<sup>th</sup> May, 2023  
NISER website

### **School of Mathematical Sciences (for students qualified in NBHM PhD written test 2023 ONLY)**

- Online Application portal will re-open on - 20<sup>th</sup> May, 2023
- Last date for filling up online application - 28<sup>th</sup> May, 2023
- Short-listed candidates list will be uploaded on - 31<sup>st</sup> May, 2023  
NISER website

- **Tentative dates for test/interview will be as follows**

1. School of Biological Sciences : 22<sup>nd</sup> -24<sup>th</sup> May, 2023
2. School of Chemical Sciences : 19<sup>th</sup> -21<sup>st</sup> June 2023
3. School of Computer Sciences : 5<sup>th</sup> -6<sup>th</sup> June, 2023
4. School of Earth & Planetary Sciences : 5<sup>th</sup> -9<sup>th</sup> June, 2023
5. School of Humanities and Social Sciences : 29<sup>th</sup>-30<sup>th</sup> May, 2023
6. School of Mathematical Sciences (Phase 1) : 12<sup>th</sup> -14<sup>th</sup> June, 2023.  
School of Mathematical Sciences (Phase 2) : 10<sup>th</sup> -12<sup>th</sup> July, 2023  
(Phase 2 - for NBHM candidates only)
7. School of Physical Sciences : 29<sup>th</sup> -31<sup>st</sup> May, 2023

- Each school will send the call letters to the candidates separately. Kindly refer to the website for the announcement of the selected candidates.
- The registration is scheduled to be held in August, 2023. The exact date will be intimated in due course of time.
- If you have any further query, kindly send an email to cpsbs@niser.ac.in, cpscs@niser.ac.in, cpscps@niser.ac.in, cpseps@niser.ac.in, cpshss@niser.ac.in, cpsms@niser.ac.in, cpsps@niser.ac.in for Biological Sciences, Chemical Sciences, Computer Sciences, Earth & Planetary Sciences, Humanities & Social Sciences, Mathematical Sciences and Physical Sciences respectively.
- Applicants are encouraged to visit school web page for more information on research activities.

**Checklist for application submission**

During online submission, you will need to have the following ready with you for uploading;

- JPEG file of your passport size photo.
- JPEG file of your valid signatures.
- Birth Certificate/10th pass certificate in support of date of birth.
- Certificate in support of category (SC/ST), only if applicable.
- Certificate and mark sheets in support of passing qualifying examination i.e Master's degree OR 4 Years / 8 Semester Bachelor's degree, whichever is applicable. In case the original pass certificate is not issued by University then a certificate from the University on its letterhead with seal of the concerned authority certifying the completion of degree should be submitted.
- Certificate/document in support of qualifying national level examination(s) viz. CSIR-UGC NET/GATE/GPAT/DBT/ICMR/JEST/NBHM or any other as applicable.
- For students applying for PhD in Mathematics through NBHM PhD written test-2023 need to upload the interview call letter received from NBHM.

**Dean, Academic Affairs**