भारतीय प्रौद्योगिकी संस्थान पटना
Indian Institute of Technology, Patna

IITP/ACAD/Ph.D./2021-22/2
Dt 21.10.2021

Ph.D. Admission – Jan 2022 (Spring Semester, AY-2021-22)

Applications are invited for admission to the Doctor of Philosophy (Ph.D.) programme, starting in Jan 2022 in the following Departments. The areas of research in IIT Patna are as follows:

Department	Areas of Research
Chemical & Biochemical Engineering	Wastewater Treatment using Advanced Oxidation Processes, Treatment of Pharmaceutical Waste, Chemical Kinetics and Catalysis, Microwave Assisted Material Processing, Renewable Energy Sources and Their Applications, Molecular Modeling and Simulation, Wetting and interfacial properties of Ionic Liquid and Deep Eutectic Solvent, condensation and evaporation, lubrication of Nano Particle-solvent system, Phase behaviour of confined fluid, ice-nucleation Process system engineering, Process design and optimization, Process Integration, Energy and Exergy management, Pinch Analysis, Renewable energy integration, Scheduling and optimization, Production planning, Robust optimization, Stochastic optimization, Artificial Intelligence in Process system engineering, Data driven optimization, Separation processes, Food processing, Continuous downstream processing, Crystallization, Reactive distillation, Carbon foot printing, Sustainable chemical processing. Computational Fluid dynamics, Phase change materials, Photocatalyst for CO2 reduction and N2 fixation, Ambient pressure NH3 formation using heterogeneous catalysis, Plasma catalysis, Photoelectrochemical processes for clean energy etc.
Chemistry	Organic, Inorganic, Physical, Theory, Biochemistry/Biomaterials, Polymer and Materials Chemistry
Civil & Environmental Engineering	**Specialization: Structural Engineering** Mechanics of Geopolymer Concrete Multiscale Modeling of Li-ion Battery Smart Material for Vibration Control Structural Fire Engineering Structural dynamics and earthquake engineering Structural stability Rehabilitation and Retrofitting of Structures

	Specialization: Geotechnical Engineering Ground improvement Techniques Geosynthetics Geoenvironmental Engineering Energy Geotechnics Toxic waste disposal Geotechnical Earthquake Engineering Environmental Geotechnics and Bio-geotechnology Rock Mechanics and underground Excavation **Specialization: Transportation Engineering** Rail Track Geotechnology Intelligent Transportation Systems Highway Engineering Pavement Engineering **Specialization: Environmental Engineering** Water and Wastewater Treatment Waste Treatment and Resource Recovery E-waste Management Removal of Micro-plastics and Emerging Contaminants from Aqueous Matrices **Specialization: Hydraulics and Water Resources Engineering** Reactive contaminant transport is groundwater systems Multiphase flow in groundwater systems Groundwater surface water interaction and recharge pathways
Computer Science and Engineering	All areas including (but not limited to) 802.11 Wireless Network, Adhoc Networks and Sensor Networks, Analog EDA, Big Data Computing, Bioinformatics, Biomedical Imaging, Bio-Text Mining, Blockchain and Smart Contract, CAD for VLSI, Cloud Computing, Cloud Security, Complex Networks, Computer Vision, Consensus in Blockchain, Database & Data Mining Applications, Discrete Event Modeling, Distributed Systems, Energy management & Intelligent transportation systems, Fault-Tolerant Computing, Federated Learning, Formal Methods for Analysis and Verification, Information Extraction, Hardware Security, Human-Computer Interaction, Image Processing, Information Systems Security, IoT Security, Machine Learning, Machine learning Security, Mobile Social Computing, Modeling of social networks, Multiobjective Optimization, Natural Language Processing, Online Algorithms, Pattern Recognition, Programming Languages, Security & Privacy, Social Networks, Soft Computing, Text Mining, VLSI Design and Methodologies, Wi-Fi Security, Wireless Networking, Multimodal Artificial Intelligence, Empathetic Conversational Artificial Intelligence and Affective Computing.

Electrical Engineering	Power Electronics, Electric Drives, Power Systems, Smart Grid, Power System Protection, Power System Stability, Control System. Semiconductor Device and Circuits, Design and Fabrication, Optoelectronic Devices, Sensor, Solar cell, Photodetectors, Semiconductor Device and Circuits for Low Power and Neuromorphic Computing, VLSI and Embedded System, Radio Frequency Integrated Circuits (RFIC), Analog Integrated Circuits (AIC) Wireless Sensor Networks, Internet of Things (IoT), Molecular Communications, Machine Learning, Deep Learning, Digital Signal Processing, Digital Image Processing, Digital Video Processing, Video Surveillance, Multimedia Communication, Tele-medicine, Biomedical Signal and Image Processing, Neuroscience, Neuro-congnition, Wearable Healthcare Monitoring, Wireless Communication, 5G and Beyond, 6G and Signal Processing for Communication and Wireless Communication, Optical Communication, Photonics, Optical Fiber based Sensing
Humanities and Social Sciences	**English:** Indian English Fiction, South Asian Fiction, Gender Studies, ELT, Myth and Literature, Migration and Diaspora Studies **Social studies**: Migration and Development, Public Policy, Sociology of Education, and Social Networks, Population and Public Health, Gender and Development, Regional Development, and Health Care Management **Economics**: Macroeconomics and Financial Economics **Linguistics**: Phonetics & Phonology; Morphology; Cognitive Linguistics and Forensic Linguistics **Management:** Organizational Behavior, Human Resource Management, Applied Psychology, Industrial and Organizational Psychology
Metallurgical & Materials Engineering	Plasma Spray Coating, Mechanical Properties of Materials, Friction stir processing and welding, Metal and Ceramic Matrix nano composites, Tribology of Materials, Process-structure-property Relationship, Solid State Chemistry, Materials Chemistry, Nanoparticles for Energy, Structural and Functional Applications, Structure- Property correlation of Dielectric, Ferroelectric, Multiferroic and other energy conversion Materials, Flash sintering of ceramics, Microstructure - property correlation in ceramics, Polymer blends and alloys, Polymer nanocomposites, Nanofillers, Hybrid nanofillers, Carbonaceous nanofillers like carbon dots and graphene
Mathematics	Nonlinear Programming, Variational Inequality, Numerical Optimization; Mathematical Sequence Designing, Mathematical Modelling in epidemiology; Reliability Estimation, Survival Analysis, Estimation under Censored Data, Statistical Inference; Numerical Analysis, Moving Mesh Methods, Singular Perturbation, A posteriori Error Estimates, ODE, PDE, Integral Equations, Fractional Order Equations, Nonlinear Problems, Black Scholes Equations, Mathematical Finance; Rings and Modules, Algebraic Coding Theory; Algorithmic graph theory; Theory of Integral Transforms, Applications of Haar Wavelets in solving ODEs and PDEs, Non-Standard Finite-Difference Techniques and their applications to ODEs PDEs, Monotone Iterative Techniques and Solutions of BVPs; Dynamical Systems, Mathematical Control Theory, Optimal Control.

Mechanical Engineering	**Design** – Mechatronics, Robotics, Tribological Machine Element Design, Continuum Mechanics, Condition Monitoring of Gear Box and Bearing, Smart Materials and Devices, Fatigue and Fracture Mechanics, Computational Mechanics (FEM/XFEM), Cyclic Plasticity, Micro Electromechanical (MEMs) Devices, Vacuum Tribology. **Manufacturing** – Additive Manufacturing, Friction Stir Welding/Processing, Finite Element Modeling of the Welding Processes, Advanced Metallic Materials, Mechanical Micromachining, Non-traditional Micromachining, Digital Manufacturing, Cyber Physical Machine Tools, Sheet Metal Forming, In situ Analysis of Manufacturing Processes, Surface Engineering. **Thermal and Fluids** – Energy, Boiling Heat Transfer, Condensation Heat Transfer, Wettability, Micro-nanostructured Surface Fabrication, Solar Thermal, Microfluidics and BIOMEMS, Hydrodynamic Stability, Fluid-structure Interaction, Biophysical Aerodynamics.
Physics	**Optics and Photonics**: Ultrafast Spectroscopy & Biophysics, Applied Optics (optical signal processing, information security), Digital Holography, Biophotonics, Nano-optics, Nanophotonics **High Energy Physics**: High Energy Physics Phenomenology **Condensed Matter Physics**: Multiferroics, Magnetic materials, Nanostructured materials, Magnetocaloric materials, Electrocaloric materials, Heusler alloys, Solid State Cooling, Nanomaterials for Energy and Sensing, High-Temperature Superconductors, Nanoscale device applications based on atomic switch technology, Renewable Energy Materials & Devices, EMI Shielding, Ferroelectrics & Dielectrics, Organic electronic devices, Nanoelectronics, Spintronics, 2D Materials

Applicants having external fellowship from recognized Government funding agencies are encouraged to apply.

CATEGORY OF ADMISSION:

The Institute admits Ph.D. students under the following categories:

1.1 REGULAR and FULL-TIME

A student in this category works full-time for her/his Ph.D. degree. They can be classified as:

1.1 a) INSTITUTE FELLOWS

S/he receives assistantship from the Institute. The qualifying Degree for Financial Support is:
1.1.1 BE/ BTech/ MSc/ MA/ MBA/ MCA /equivalent degree with valid GATE score above the prescribed cut off level/ NET qualification.

B.Tech from IITs with CGPA 8.0 and above are exempted from GATE qualification as per MHRD (*now MoE*) letter no. 17-2/2014-TS.I dated Feb 18, 2015.

1.1.2 ME/ MTech/ MPhil /equivalent degree with GATE/ NET qualification.
Age Limit: Please refer to Eligibility Criteria for Admission into Ph.D. Programme

1.1 b) RESEARCH FELLOWS (JRF/SRF)

S/he receives fellowship from any government recognized funding agencies, such as CSIR, UGC, DBT, NBHM, DST (INSPIRE programme), etc

1.2 SPONSORED

A student in this category is sponsored by a recognized industrial R&D organization, academic institution (universities/colleges), government organization (defence or other ministries of the Government of India or any other government organizations including PSUs and autonomous bodies) or reputed industries (as may be recognized by this Institute) for doing research in the Institute. The Institute does not provide any assistantship/fellowship to such a student.

Candidate in Sponsored category must be a regular employee of the sponsoring organization (of repute) with a minimum of two-year job experience in the respective field. A student in this category is therefore a professionally employed person, who pursues Ph.D. while continuing her/his services. The candidate has to work full time in institute to obtain the degree for a period of 3 years. **An intending sponsored candidate must produce NOC on the day of interview in the prescribed format: Form I, available in the website, link** https://www.iitp.ac.in/acad/admission.php

1.3 SELF-FINANCED

A student in this category may work full-time towards the Ph.D. Programme. The Institute does not provide any assistantship/fellowship to such a student. The applicant should have qualified a national level exam (NET/GATE).

1.4 PROJECT STAFF

This category refers to a student who, as a project staff, is working on a sponsored project (registered in R&D Unit, IIT Patna). The said project staff is eligible to be admitted in the Ph.D. Program (of this Institute) to work on a full-time basis. The minimum remaining duration of the project at the time of admission as well as tenure of the project employee should be at least 2 years from the date of joining the Ph.D. program. **She/he must have qualified GATE/NET**.

If the project gets completed before the student completes her/his Ph.D., her/his category will no longer be that of Project Staff and her/his category will be converted to that of SELF-FINANCED unless she/he is granted an assistantship/fellowship from the Institute or any other agency.

A project staff intending to join the Ph.D. program of IIT Patna must produce NOC on the day of interview in the prescribed format: **Form II, available in the website, link** https://www.iitp.ac.in/acad/admission.php for admission through Principal Investigator, Head of the Department and Dean/ Associate Dean R&D with suitable endorsement.

1.5 EMPLOYED & PART-TIME

A candidate in this category is a regularly employed person (including the staff of IIT Patna), who pursues the Ph.D. program, while continuing the duties of her/his service. The institute does not provide any assistantship/ fellowship to such a student. The minimum residential requirement is one or two semester(s) depending on the completion of mandatory course work required for Ph.D. students.Candidate in Employed and Part-time category must be a regular employee of his/her organization with at least two years of professional experience in the respective field.**The work-experience of minimum two years is essential with current employer.** NOC must be produced on the day of interview in the prescribed format: **Form III**, **available in the website, link** https://www.iitp.ac.in/acad/admission.php

Minimum Eligibility Criteria for Admission to Ph.D. Programme:

In all the disciplines, the upper **age limit is 28 years (B.Tech./B.E./M.Sc./MA/MCA/MBA) and 32 years (M.Tech./M.E./M.S./M.Phil.)** to be calculated as on the last date of application and is applicable **only** for candidates applying in Regular and Full time category, as institute fellow. For Research/ project fellows, age limit will be as per the funding agency norms. In absence of any age criteria, the Institute norms will be followed. Upper age limit is relaxed up to 05 years in case of

candidate belonging to Schedule Castes/Schedule Tribes, Women, Physically Handicapped and OBC applicants.

A.1 Ph.D. in Engineering

For admission to the Ph.D. Programme in Engineering Department, a candidate must satisfy one of the following criteria:

A.1.1 Candidates having M.Tech./M.E. degree in a Engineering/Technology, with a minimum CPI of 6.5 or 60% of marks.

A.1.2 Bachelor's degree in Engineering/Technology (from any Institute other than IITs) in a relevant area with a minimum CPI of 8.0 or 75% of marks.
A.1.3. Bachelor's degree from an Indian Institute of Technology (IIT) in a relevant area with a minimum CPI of 7.0.

A.1.4. Master's degree in Science in a relevant area with a minimum CPI of 7.5 or 70%.

A.2 Ph.D. in Science

For admission to the Ph.D. Programme in Science departments, a candidate must satisfy one of the following criteria:
A.2.1 M.Phil. or Master's degree in Science in a relevant area with a minimum CPI of 6.5 or 60% of marks.

A.2.2 Master's degree in Engineering/Technology in a relevant area with a minimum CPI of 6.5 or 60% of marks

A.2.3 Bachelor's degree in Engineering/Technology from an Indian Institute of Technology (IIT) in a relevant area with a minimum CPI of 7.0.

A.2.4 Bachelor's degree in a related area in Engineering/Technology (from any Institute other than IITs/IISc) in a relevant area with a minimum CPI of 8.0 or 75% of marks.

A.3 Ph.D. in Humanities and Social Sciences
For admission to the Ph.D. Programme in the department of Humanities and Social Sciences (HSS), a candidate must satisfy one of the following criteria:

A.3.1 M.Phil.or Master's degree in Arts/Commerce/Science in a relevant area with a minimum of 55%marks or equivalent.

A.3.2 Master's degree in Engineering/Technology/Design in a relevant area with a minimum CPI of 6.5 or 60% marks.

A.3.3 Bachelor's degree from an Indian Institute of Technology (IIT) in a relevant area with a minimum CPI of 7.0.

A.3.4 Bachelor's degree in Engineering/Technology (from any Institute other than IITs/IISc) in a relevant area with a minimum CPI of 7.5 or 70% marks.

Candidates should note that if both CPI/CGPA and percentage are indicated in transcript/marksheet of the qualifying degree then only CPI/CGPA shall be taken into account for determining eligibility.

Direct Admission (Waiver of Entrance Test):

For candidates in Sciences, Engineering &Technology:

The Institute may admit exceptionally bright students and Full-time (Institute Fellows) directly (i.e., without entrance test) into the Ph.D. program.
Eligible candidates meeting one of the following criteria may be considered for a waiver of the entrance test:

1. B.Tech. from the IITs, graduated within the last five years, with a degree in the respective discipline with a CPI/CGPA of 8/10 and above.
2. Masters from the IITs/IISc, graduated within the last five years, with a degree in the respective discipline with a CPI/CGPA of 8.5/10 and above.

Such a candidate has to apply online. Additionally, an email must be sent with scanned copy of the supporting documents to aracademic@iitp.ac.in
There would be no admission in direct admission category in Department of Humanities and Social Sciences.

Relaxation for SC/ST Candidates:

Eligibility criteria will be relaxed by 5% marks or 0.5 CPI for SC/ ST applicants.

Reservations:

The reservation of seats in admissions for SC, ST, OBC, EWS categories and for Persons with Disability (PwD) will be as per Government of India rules. OBC (Non-creamy layer) candidates will have to produce certificate and self-declaration statement as per formats indicated at Annexure- I and II **available in the website, link** https://www.iitp.ac.in/acad/admission.php

FINANCIAL SUPPORT:

The Institute assistantships will be available to eligible (Indian) students as per prevailing (MoE, GoI) norms, as applicable from time to time. At present total emoluments are Rs 31,000/- per month.

Assistantships from external funding organizations will be available as per terms and conditions of the concerned funding organizations.
Students receiving assistantships from the Institute or fellowships from any other funding agencies are required to perform academic duties as per prevailing norms.
The continuation of the assistantship/fellowship is subject to satisfactory performance of the assigned duties and satisfactory progress of the student in the Ph.D. Programme.

APPLICATION PROCEDURE (go through it very carefully):

Firstly, application fee must be paid before proceeding for online application. The details of application fee are given below:

Category	Male	Female
GEN/EWS/OBC-NCL	Rs **300/-**	Rs 150/-
SC/ST/PwD	Rs 150/-	Rs 150/-

The application fee should be paid online through SBI Collect. Application fee shall not be refunded.

Link for payment: https://www.onlinesbi.com/sbicollect/icollecthome.htm?corpID=595859

After the payment, a reference/journal number will be generated, which must be mentioned in the application form and the printed e-receipt of payment must be preserved carefully.
Only after the above step and noting down reference/journal number generated through payment, candidates are required to use the following link to fill and submit application form online. Please read complete advertisement very carefully before applying online. To avoid internet congestion, candidates are advised not to wait for the last date of application.

Link for online application (should be accessed after payment): https://www.iitp.ac.in/phd_app/

After successful online application, candidates shall receive application details to the registered email address.

Candidates, applying for more than one department, must submit a separate application with separate fee- payment. Fresh fee payment is required for each application.

The candidates are required to take printout of the application details received in email after submitting online application. This printout along with self-attested copies of mark sheets & certificates (from class X to highest degree obtained/appeared), caste certificate (if applicable), GATE /NET/Relevant certificate related to any fellowship, experience certificate, other testimonials (both sides), and printed e-receipt of online payment must be produced on the day of test/interview, failing which the candidature is liable to be rejected.

If any of the prescribed documents (as mentioned above) is not produced on the day of test/interview, then attending test/interview may not be allowed.

Please note that depending upon the situation, above documents can be asked any time before the day of interview.

Candidates are NOT required to send application by post.

No call letter will be sent by post. The candidates must check email and website regularly for important information. On the day of test/interview, a candidate must produce his/her valid original Identity card.

Selection:

The Institute reserves the right to call a limited number of candidates for test/interview, based on performance in GATE/NET, grades/marks in the qualifying examination, shortlisting criteria etc and merely fulfilling minimum eligibility criteria does not guarantee call for test/interview.

Important Dates:

Start Date of On-line Application: 21.10.2021

Last Date of On-line Application: 15.11.2021

Helpline: Please note that no correspondence / query shall be entertained regarding correction of mistake in the submitted application, details already available in the advertisement and irrelevant matters. First issues/problems should be identified strictly as provided in the following table and use ONLY the concerned link/ email id mentioned against the issues.

S.N.	Issues	
1	Technical issues regarding online application	https://docs.google.com/forms/d/e/1FAIpQLSeU-UYcisqKVEBcBejY1YvpJz2FYmvu3DVoKSF7abuYNwLjRw/viewform?usp=sf_link
2	Academic matter	acadphd@iitp.ac.in 06115-233-684/697
3	Fee -payment/ SBI collect	arfa@iitp.ac.in 06115-233-062

Note: The above information is not the complete set of Rules & Regulations for the Ph.D. programme of IIT Patna

Legal Jurisdiction: The court at Patna alone shall have the jurisdiction to settle and decide all matters and disputes related to the above referred admission process.