Ph.D. Admission – January 2019 (Spring Semester, AY-2018-19)

Applications are invited for admission to the Doctor of Philosophy (Ph.D.) programme, starting in January 2019 in the following Departments. The areas of research in IIT Patna are as follows:

Department	Areas of Research
Chemical & Biochemical Engineering	Process system engineering, Process design and optimization, Process Integration, Energy management, Pinch Analysis, Renewable energy integration for process applications, Scheduling and optimization of batch processes, Sustainable engineering of resources, Molecular Modelling and Simulation, Statistical Thermodynamics, Equilibrium, Dynamic and Interfacial Properties of Complex fluids, Development of Novel Materials like super-hydrophobic, super-oleophobic, anti-fouling, anti-icing surfaces etc.; Self-Assembled Monolayer in application of chemical sensor, Thermo-physical properties of actinides compounds in application of nuclear fuel. Waste Water Treatment Technology, Microwave Assisted Material/Biomaterial Processing, Renewable energy sources and their applications, Catalysis, Gasification/ Pyrolysis, Chemical Reaction Engineering and Reactor Design, Heat Transfer, Fluidization Engineering, Process intensification and purification technology, Nano catalysis Engineering for clean energy applications (particularly for reactions such as NH_3 production, photocatalytic CO_2 reduction to fuel, CO_2 capture), Investigation of Gas-solid reaction at micro/nanoscale with aid of in situ spectroscopy Catalysis for clean energy application, Solid-gas based reactions at bulk and nanoscale, electrochemical energy storage, fuel cells and batteries. Bio-process Engineering, Environmental Biotechnology, Biomass pyrolysis/hydrothermal processing for biochar and energy, Algal Technologies, Microbial electrochemcial system, Electrocoagulation for wastewater treatment, Nano-(Bio-)technology for biofuel/bioremediation, super/sub-critical extraction of microbialmetabolites, Biopocessing of agro/rural waste for valued products. Separation Processes, Crystallisation – polymorphs, Continuous Pharmaceutical Crystallisation, Computational fluid dynamics, Non-Newtonian flow rheology, Motion of bubble/drops, Particle dynamics in multiphase flows, CFD-DEM coupled simulations, Heat transfer in Nanofluids, Modelling of Phase change materials and any other important specialization in chemical engineering.
Chemistry	Organic Chemistry, Carbohydrate Chemistry, Gas Phase Molecular Spectroscopy, Computational Chemistry, Theoretical Chemistry: Reaction dynamics and Spectroscopy, Theory and Molecular Simulation of Liquid. Coordination driven self-assembly and supramolecular chemistry, Polymer chemistry (synthesis/characterization and applications). Green Polymer Synthesis, Polymer Bioconjugates and Nanomaterials, Fluorescence Spectroscopy, Solid state and Materials Chemistry. *Please note that some areas of research in chemistry department like Theoretical Chemistry: Reaction dynamics and Spectroscopy, Theory and Molecular Simulation of Liquid, Gas phase Molecular Spectroscopy, Computational Chemistry, Fluorescence Spectroscopy) accepts eligible students with Physics as major subject in their Masters or M.Phil. Hence they can apply for Ph.D in Chemistry department.*

Civil & Environmental Engineering*	Environmental Engineering – Water and Wastewater Treatment, Waste Treatment and Resource Recovery, E-waste Management, Automated Waste Sorting, Water Treatment, Environmental Application and Implication of Nanoparticles; In-situ groundwater remediation, Colloid transport, Nano-Bioremediation; Structural Engineering; Rail Track Geotechnology; Transportation Engineering; Pavement Engineering; Geotechnical Engineering.
Computer Science and Engineering	Natural Language Processing, Machine Learning, Cross Lingual IR, Information Extraction Online Algorithms, Complex Networks, Social Networks, Theoretical Computer Science. CAD for VLSI, Real Time Embedded Systems, Algorithms, Deep learning Natural Language Processing, Machine Learning and Deep Learning Applications, Information Extraction, Web mining and Text mining Network Science, Online Social Networks, Social Media Analysis, Intelligent Transportation Systems Cloud Computing, Big Data Computing, Distributed Systems, Network Virtualization Programming Languages, Analysis and Verification, Robotics, Data Privacy and Security Security & Privacy and Database Systems Lightweight Cryptography, Computer Security, Network Security, Cloud computing Security. Machine Learning, Multiobjective Optimization, Text Mining, Bioinformatics, Soft Computing, Deep Learning Fault tolerant Computing, Secure systems, Hardware Security, Application of Novel Nano-devices to Hardware Security, Ubiquitous Computing and Embedded Engineering, VLSI Design, Testing and Methodologies. Image Processing, Medical Imaging, Bioinformatics, Computer Vision Social Computing, Human Computer Interaction 802.11 Wireless Network, Wi-Fi Security, Discrete Event Modeling
Electrical Engineering	Photonics, visible and infrared optical communication, Control system, VLSI & Embedded system, Digital Signal Image and Video processing, Neurocognition and Neuroscience, Biomedical Signal and Image Processing, Semiconductor devices and circuits, Wireless Communications, 5G Communications, Signal Processing for Digital Communication, Power Electronics, Electrical Drives and Renewal Energy Integration, Power System Stability and Control, Power System Protection, Wide Area Monitoring, Protection and Control, Optoelectronics devices, Solar Cell and Sensors, 6G wireless communication and Signal processing for wireless communication, Wireless Sensor Networks, Internet of Things, Radio Frequency Integrated Circuits (RFICs), Analog and Mixed Signal Integrated Circuits, State estimation, Underwater target localization.
Humanities and Social Sciences	For Humanities and Social Sciences: 1. Migration and Diaspora Studies, Education and Society, Technoscience, Social Development, & Public Policies. 2. Population and Public Health, Gender and Development, Environmental Health, Regional Development, & Health Care Management. 3. Microeconomics, Macroeconomics, Development Economics, Financial Economics, Econometrics, International Trade, Political Economy. For Linguistics: Phonetics and Phonology,Sociolinguistics and Language Documentation. For English: English Language Teaching, Indian Writing in English, Gender Studies, English Literature and Language, American Literature. For Management:

	Human Resource Management, Organizational Behavior
Metallurgical & Materials Engineering	Physical metallurgy, Ceramics, Process-Structure-Property Correlations inHigh Temperature Oxide Systems, Polymer science and technology withreference to polymer blends and alloys, polymer nanocomposites, hybridnanofillers for polymers andadhesion science and technology
Mathematics	Algebraic Topology, Algebraic Coding Theory, Algebraic Graph theory,Theory and Application of Wavelets, Analysis of Partial DifferentialEquations: Both Analytical and Computational Aspects, Rings and Modules, Nonlinear Optimization, Variational Inequalities, Semi-Infinite Programming; Application of Differential Equations in Ecology and Epidemiology, Nonlinear Dynamics, Mathematical Modeling, Optimal Control, Numerical Analysis Based on Finite Differences Elementsand Volumes Methods, Numerical Functional Analysis, Mathematical ControlTheory, Nonlinear Functional Analysis, Statistical Decision Theory,Estimation under Censored Data, Reliability Estimation, Algorithmic GraphTheory.
Mechanical Engineering	Design of Tribological Element and Lubrication, Under-water robotics, virtual reality, CAD/CAM, Fatigue and Fracture of Welded Joints, sheet metal forming, computational plasticity, molecular dynamics for deformation and damage simulation on metals, In situ analysis of Manufacturing Processes, Friction stir welding, Micro-Friction Stir Welding, Additive Friction Stir Processing, hot deformation of metallic materials, additive manufacturing, Surface Engineering and Tribology, Biomechanics, Condition monitoring, XFEM,FEM/ Meshfree Method, two-phase flows, heat transfer, Boiling, Condensation, Energy, Heat Exchangers, fluid-solid interaction, biophysical hydro/ aerodynamics, Vibrations and Rotordynamics.
Physics	Condensed Matter Physics, Nanoelectronics, Spintronics Quantum Optics (Experimental) Computational Atomic and Molecular Physics Nanoscale device applications based on atomic switch technology Experimental Condensed Matter Physics: Nanomaterials, Magnetic materials, Multiferroics, Nanocomposite, Ferroelectric relaxor materials & highly correlated electron materials Bose-Einstein condensate (Theory), Quantum Optics (Theory) Biophotonics & Nanophotonics Applied Optics (optical signal processing, information security), Digital Holography Ultrafast Spectroscopy & Biophysics Renewable Energy Materials & Devices, EMI Shielding, Ferroelectrics & Dielectrics Condensed Matter & Nanoscale Physics Organic Electronics Experimental High Energy Physics Condensed Matter (Theory) [Quantum transport, 2D layered materials, Topological insulators, Charge-spin-heat transport, strongly correlated electronic systems, Light-matter interaction] High Energy Physics Phenomenology High Energy Physics (physics beyond the Standard Model, Collider Physics, Supersymmetric Phenomenology), Dark Matter.

The candidates may be asked to provide referee details.

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 PhD degree. They can be classified as

1.1 a)INSTITUTE FELLOWS

She/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   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 Eligibility Criteria for Admission into Ph.D. Programme

1.1 b) RESEARCH FELLOWS (JRF/SRF)

She/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 PhD 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 submit his/her application in prescribed format (Form I, available with the application form) for admission through his/her employer, who will forward the same to the Institute with suitable endorsement.**

1.3 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 PhD 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 PhD, 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 PhD program of IIT Patna must submit her/his application in prescribed form (**form II, available with the application form**) for admission through Principal Investigator, Head of the Department and Dean/ Associate Dean R&D with suitable endorsement.

1.4 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 letter (**Form III**, **available with the application form**) must be attached with the duly filled in application form.

Minimum Eligibility Criteria for Admission in 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 from the last date for receiving the application form (Printed and Signed version, **05.11.2018**) 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 is relaxed up to 05 years in case of candidate belonging to Schedule Castes/Schedule Tribes, Women, Physically Handicapped and OBC applicants.

A.1 PhD in Engineering
For admission to the PhD 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 PhD in Science

For admission to the PhD 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 PhD in Humanities and Social Sciences
For admission to the PhD 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 80% marks.

Direct Admission (Waiver of Written Test):

For candidates in Sciences, Engineering &Technology:

The Institute may admit exceptionally bright students and Full-time (Institute Fellows) directly (i.e., without written test) into the Ph.D. program.
Eligible candidates meeting one of the following criteria may be considered for a waiver of the written 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 application must be sent with supporting documents to the Assistant Registrar, Academics.

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 categories and for Persons with Disability (PD) will be as per Government of India rules. OBC (Non-creamy layer) candidates will have to enclose certificate and self-declaration statement as per formats as indicated at Annexure- I and II provided with the application form.

FINANCIAL SUPPORT:
The Institute assistantships will be available to eligible (Indian) students as per prevailing (MHRD, GoI) norms, as applicable from time to time. At present total emoluments areRs 25,000/- 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.

For the applicants appearing in the Ph.D. interview under Regular and Full-timecategory, to-and-fro Sleeper Class Railway Fare or equivalent will be paid by the shortest route from the place of contact address (as filled in the application form) to IIT Patna, Permanent Campus, Bihta on producing the original tickets.

APPLICATION PROCEDURE:

Candidates are requested to use the following link to fill and submit application form online.

Link: http://academic.iitp.ac.in

For January 2019 admission in one of the Departments, **the online link will remain active** *till,* **25.10.2018** Please login and fill up all the parts of the application form. Follow the instructions given in the document "*Instructions to Candidates*". At the end a final PDF will be generated. You can download it from your registered email address or from your application page.

The application fee of **Rs. 300/- for General/OBC** (Male) candidates and **Rs. 150/- for SC/ST/PD/Female** (all categories) candidates must be submitted through online mode.

Candidates must use the following link to submit application fee online and send the printed e-receipt along with the hard copy of application.

Link: https://www.onlinesbi.com/prelogin/icollecthome.htm?corpID=595859

You are requested to send final submitted application generated online duly signed 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 and other testimonials (both sides) and printed e-receipt of online payment to the following address " *TheAssistant Registrar (Academics), Indian Institute of Technology Patna, Bihta, Kanpa Road, District - Patna, Bihar , PIN – 801103"* to reach on or before **05.11.2018**. Please note that your application must be complete in all respects, along with all documents, including e-receipt of payment.

The words "Application for Ph.D. admission in the Department of _____ (*Name of the Department where applying for*)" must be written on the top of the envelope for sending the completed form.

Candidates applying for more than one department should submit a separate application for each department.
Please note that no application shall be received after the last day of submission of the hard copy of application by post. The candidates are advised to post well in advance as the institute will not be responsible for any postal delay. In the absence of receipt of the hard copy, the application shall not be processed.
Selection:
The Institute reserves the right to call a limited number of candidates for written test or/ and interview, based on performance in GATE/NET, grades/marks in the qualifying examination, etc.

Important Dates:
Start Date of On-line Application: 05.10.2018
Last Date of On-line Application: 25.10.2018
Last Date for receipt of completed Application Forms by IIT Patna is: 05.11.2018

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

For any further information, please contact
   The Assistant Registrar (Academics),
    Indian Institute of Technology Patna, Bihta,
   Kanpa Road, District - Patna, Bihar,
   PIN – 801103
   Email –tarique@iitp.ac.in, aracademic@iitp.ac.in
   Phone : +91 (612) 3028684/3028697

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.