



भारतीय प्रौद्योगिकी संस्थान मण्डी

Indian Institute of Technology Mandi



भारतीय प्रौद्योगिकी संस्थान जम्मू

Indian Institute of Technology Jammu

IIT Mandi - IIT Jammu PhD Joint Degree Program Information Brochure Admissions 2023-2024





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About IIT Mandi

The Indian Institute of Technology Mandi (IIT Mandi), one of the premier technical institutes in India. IIT Mandi was established in 2009 with the aim of providing world-class education and cutting-edge research in engineering, science, and technology. Since its inception, the institute has strived to achieve excellence in education, research, and innovation.

Located in the scenic town of Mandi in the Himalayan foothills, the institute offers a unique learning experience to its students. With state-of-the-art facilities and world-class faculty members, IIT Mandi provides a conducive environment for research and learning. The institute offers undergraduate, postgraduate, and doctoral programs in various disciplines of engineering, sciences, and humanities.

At IIT Mandi, we believe in fostering an environment of innovation and creativity. Our faculty members are renowned experts in their fields and are committed to providing their students with the best possible education. With our multidisciplinary approach to education, we aim to produce graduates who are well-rounded and equipped to solve real-world problems.

We take pride in our research culture and encourage our students to engage in cutting-edge research in various fields. Our research facilities are equipped with state-of-the-art equipment and resources, providing our students with ample opportunities to explore their interests and pursue their passions.

Institute Webpage: www.iitmandi.ac.in

About IIT Jammu

The plan to establish IIT Jammu, along with four other IITs in Chhattisgarh, Goa, Andhra Pradesh, and Kerala, was announced by the Hon'ble Finance Minister in the Union Budget 2014-15.

The Indian Institute of Technology Jammu was inaugurated on 6th August 2016, and welcomed the first batch of students into the campus in Paloura, Jammu. In the initial phases, the establishment of IIT Jammu was done under the mentorship of IIT Delhi.

In 2018, IIT Jammu shifted its primary operations to the 400 acres of lush green land in Jagti village, just outside Jammu city, provided by the Government of Jammu and Kashmir for establishing its main campus. Currently, Phase 1A of the main campus, spread across 25 acres, is operational. Phase 1B and 1C are undergoing rapid construction. The main campus of the Institute is located on National Highway-44, 17 km from the Jammu Airport and 19 km from the Jammu Tawi Railway Station.



The campus in Paloura now accommodates PhD scholars. It also houses the high-end research facility: Central Instrumentation Facility (CIF or SAPTARSHI Labs), equipped with highly sophisticated state-of-art instruments to enable researchers in basic sciences and engineering.

Institute Webpage: <https://www.iitjammu.ac.in/>

About PhD JDP

The Joint Degree Program (JDP) offers PhD students enrolled in both institutions the chance to collaborate on a multidisciplinary research project with faculty members and research teams from IIT Mandi and IIT Jammu, as well as to take advantage of the facilities and professional development opportunities offered by both institutions.

Important Guidelines for PhD Application

1. Please read the instructions given in the brochure carefully before filling up the applications.
2. Online Application form & Information brochure (Including the admission schedule along with the important dates) is available on the institute website at the following link: <https://alliance.iitmandi.ac.in/iitjammu/>
3. You are required to submit the application form ONLINE. No Downloadable Forms will be available after filling the form, you are advised to take a print of your application for your records.
4. For each project, candidate should submit a separate application with the application fee.
5. The application fee is as follows:

Category	Amount in ₹
General/EWS/OBC/OBC(NCL)/Transgender/Foreign Nationals	200
Women/SC/ST/PD	100

- a. **Mode of Payment: SBI Collect Portal.**
 - b. Applicant should submit fee on SBI collect portal of the IIT Mandi and submit generated transaction number to the admission application portal Link: <https://www.onlinesbi.sbi/sbicollect/collecthome.htm>)
 - c. One application fee is valid for the single application. The application fee is **NON-REFUNDABLE.**
6. OBC candidates may note that the limit for annual income is Rs. 8 Lakhs for determining the creamy layer among Other Backward Classes (OBCs) candidates. The OBC (NCL) certificate



issued for the financial year 2023-24 by the Competent Authority in the prescribed format must be uploaded in the ONLINE application form.

7. Economically Weaker Sections (EWS) candidates may note that the limit for annual income is Rs. 8 Lakhs for determining the eligibility for benefit under Economically Weaker Sections (EWS) reservation. The EWS certificate issued by the Competent Authority in the prescribed format must be uploaded in the ONLINE application form and submitted at the time of admission.
8. Seats are reserved for Economically Weaker Sections (EWS) / Other Backward Class Non-Creamy Layer (OBC-NCL) / Schedules Caste (SC) / Scheduled Tribe (ST) and Person with Benchmark Disability (PwD) categories as per Government of India norms.
9. You should check Institute website for results / important announcements.
10. You should check emails sent to your email address provided in your application for all important communications and announcements if any.
11. Merely fulfilling eligibility criteria does not entitle a candidate to be called for the written test/interview. Decision of Institute authorities will be final. Admission is based on GATE / Written test / Interview performance in addition to general eligibility criterion, the applicants must also satisfy the eligibility criteria specified for the respective Departments / Centres / Schools / Interdisciplinary Groups.
12. Candidates, if called for written test/interview should show/ bring with them (i) Photo ID Card, (ii) Printed copy of the application submitted online, (iii) Thesis / dissertation / report / publications (iv) copy of certificates and mark-sheets.

Important Dates for Admission

Starting date for filling Online Application	16 th November, 2023
Last date for filling Online Application	30 th November, 2023
Declaration of shortlisted candidates list	Will be Published on IIT Mandi and IIT Jammu website
Shortlisted candidates will be informed by email	

Contact Details

In case of any query related to the Ph.D. Programme admission process you may contact respective school / Centre, the contact details are:



IIT Mandi

Name of School/Centre	Email ID	Contact No.
Centre Artificial Intelligence and Robotics (CAIR)	cairoffice@iitmandi.ac.in	----
School of Biosciences & Bioengineering	sbboffice@iitmandi.ac.in	01905-267061
School of Chemical Sciences	scsoffice@iitmandi.ac.in	01905-267277
School of Civil & Environmental Engineering	scene_admissions@iitmandi.ac.in	01905-267180
School of Computing and Electrical Engineering	sceoffice@iitmandi.ac.in	01905-267071
School of Humanities & Social Sciences	shssoffice@iitmandi.ac.in	01905-267719
Indian Knowledge System and Mental Health Application (IKSMHA)	iksmha@iitmandi.ac.in	---
School of Management	somoffice@iitmandi.ac.in	01905-267119
School of Mathematical & Statistical Sciences	smssoffice@iitmandi.ac.in	01905-267929
School of Mechanical and Materials Engineering	smmeadmissions@iitmandi.ac.in	01905-267138
School of Physical Sciences	spsoffice@iitmandi.ac.in	01905-267812

IIT Jammu

Name of School/Centre /Department	Email ID
Department of Biosciences and Bioengineering	hod.bsbe@iitjammu.ac.in
Department of Chemical Engineering	hod.chemical@iitjammu.ac.in
Department of Chemistry	hod.chemistry@iitjammu.ac.in
Department of Civil Engineering	hod.ce@iitjammu.ac.in
Department of Computer Science and Engineering	hod.cse@iitjammu.ac.in
Department of Electrical Engineering	hod.ee@iitjammu.ac.in
Department of HSS	hod.hss@iitjammu.ac.in
Department of Materials Engineering	hod.materials@iitjammu.ac.in
Department of Mathematics	hod.mathematics@iitjammu.ac.in
Department of Mechanical Engineering	hod.me@iitjammu.ac.in
Department of Physics	hod.physics@iitjammu.ac.in

Academic Structure

Program management

A Doctoral Advisory Committee (DC) shall be set up for each JDP Scholar to support and monitor progress of the JDP Scholar throughout the candidature until the thesis has been submitted. The DC shall consist of the following members.

Chair/Head of the School/Department of the Home Institute or his/her nominee	Chairperson
Supervisor from the Home institute	Member
Supervisor from the Host institute	Member



Co-supervisor (s), if any with justification	Member (s)
Subject Expert from the Home Institution	Member
Additional members may be appointed to meet the requirements	Members

Coursework Requirements

The JDP Scholar shall satisfy the minimum academic coursework requirements of the Home Institution. Additional courses may be taken when recommended by the DC. If a JDP scholar credits a course in one institution, the credits will be automatically transferred to the other institution and will be counted towards the degree requirement.

Joint Degree Program Structure

- Candidates have a **“Home Institution”** where they begin their studies and spend the majority of time. The expectation is that candidates will spend a minimum of 12 months at the other, **“Host Institution”** the timing and duration of this will depend on the program of research but in general will be in the second or third year of the degree. Travel to and study at the Host Institution will be subject to the usual requirements of the institute.
- As a condition of enrolment on the PhD JDP, candidates are required to:
 - Spend a minimum of one year* (two semesters) enrolled at each institution.
*Candidates registered as part-time PhD or under External Registration program need to spend the minimum residential requirement criteria of both the institute as mentioned in their ordinances and regulations.
 - Undertake a program of progress monitoring and examination that meets the requirements of both institutions.
 - Comply with the rules, regulations, policies, codes and procedures of both institutions.
 - Write and submit a thesis for defense by oral examination at the home Institution.
- Candidates for the PhD JDP will be enrolled in a PhD program in parallel at both institutions. The supervisory team will comprise academics from both institutions who will provide guidance and support throughout the doctoral program. Candidates will benefit from the research community, networking, and collaborations of the IIT Mandi – IIT Jammu. Through enrolment at both institutions, candidates will have access to services and support provided at IIT Mandi and IIT



Jammu, including a variety of professional and personal development opportunities for researchers.

- The primary supervisor shall be from the Home Institution. There must be a Joint supervisor from the Host Institution.
- The PhD JDP includes a tailored program of progress monitoring to fulfil the requirements of both institutions. On successful completion of the program requirements, candidates will be awarded a PhD degree jointly by both the Institutions.

Admissions are currently open under the following research projects:

1.	On-chip Radiation Hardened In-Memory Computing for Edge device applications	
	<p>It is proposed to design on-chip radiation hardened in-memory computing for edge device applications. When applied to artificial intelligence edge devices, the conventionally von Neumann computing architecture imposes numerous challenges (e.g., improving the energy efficiency), due to the memory-wall bottleneck involving the frequent movement of data between the memory and the processing elements (PE). In-memory computing is a promising candidate approach to breaking through this so-called memory wall bottleneck.</p> <p>Memory cells provide unlimited endurance and compatibility with state-of-the-arts logic process. Therefore, radiation hardened in-memory computing design in SCL 180nm CMOS or any of the radiation hardened technology (XFAB or AMS or ST's FDSOI) is proposed to be designed as a part of the project. Later the same will be used for the AI edge applications.</p>	
	<p>Home Institute: IIT Mandi Supervisor: Dr. Hitesh Shrimali School/Dept.: SCEE</p>	<p>Host Institute: IIT Jammu Supervisor: Dr. Ambika Prasad Shah School/Dept.: Department of Electrical Engineering</p>
2.	Biogeochemical investigations of rivers Beas and Tawi and implications for downstream water quality	
	<p>The student will explore biogeochemical processes in river systems to understand sediment transport, water quality, sediment-water interactions, distribution of contaminants. The proposed project will consider the Beas River and Tawi river as two river systems. Student will be primarily hosted at IIT Mandi and will spend one year at IIT Jammu to complete this project.</p>	
	<p>Home Institute: IIT Mandi Supervisor: Dr. Harshad Vijay Kulkarni School/Dept.: SCENE</p>	<p>Host Institute: IIT Jammu Supervisor: Dr. Vinay Chembolu School/Dept.: Civil Engineering</p>
3.	Colloid facilitated contaminant transport through porous media	
	<p>The project will aim to develop the semi-analytical solution for contaminant transport in presence of colloids in groundwater flow systems with stagnant zones. It will also investigate the effect of stagnant zones on the transport of contaminants with colloids. The developed solution would be validated through the experimental studies.</p>	
	<p>Home Institute: IIT Mandi Supervisor: Dr Deepak Swami</p>	<p>Host Institute: IIT Jammu Supervisor: Dr Nitin Joshi</p>



	School/Dept.:SCENE	School/Dept.:Civil Engineering Department
4.	UAV-assisted wireless networks: deployment and path planning	
	The recent advances in the technologies concerning UAVs, coupled with the emergence of IoT, ushered in the era of rapidly deployable, application-centric, ultra-dynamic UAV-enabled wireless networks. These networks can cater to various use cases ranging from (temporarily) boosting the throughput of existing networks deployed in areas with high user density (e.g., convention centers, stadiums) to extending the network coverage in remote rural areas or disaster-stricken areas (e.g., flood, earthquake). We are interested in studying the problems related to the 3D deployment of UAVs and the prolongation of flight time by improved path planning of UAVs.	
	Home Institute: IIT Mandi Supervisor: Dr. Siddhartha Sarma School/Dept.: SCEE	Host Institute: IIT Jammu Supervisor: Dr. Ajay Singh School/Dept.: Department of Electrical Engineering
5.	Integrated and continuous microfluidic platforms for heavy metal-ion detection using functional carbon materials	
	Heavy metal pollution of the environment is a major global issue in the current fast industrialisation scenario. Inexpensive sensor devices with a high precision and lower limits of detection have therefore attracted a lot of attention. Carbon materials are extensively used in various micro and nano sensing applications based on solid-state as well as fluidic devices. The goal of this project is to develop a miniaturized, point-of-care colorimetric/ electrochemical sensor for metal toxins using both rigid and flexible substrates. This will provide a durable solution for continuous monitoring of heavy metal ions. Moreover, the integration of smartphone camera readouts and machine learning approach with such sensors will introduce a new lab-on-mobile concept and lead to potential commercialization.	
	Home Institute: IIT Mandi Supervisor: Dr. Swati Sharma School/Dept.: SMME	Host Institute: IIT Jammu Supervisor: Dr. Ravi Kumar Arun School/Dept.: Chemical Engineering
6.	Design and modeling of ultra high-performance concrete for structural strengthening	
	A large portion of the built environment in the Himalayan region are vulnerable to impending earthquakes and associated multi-hazard scenarios. To safeguard such structures, appropriate measures are to be planned and implemented. Using advanced materials, such as ultra high-performance concrete (UHPC) has potential to be used for strengthening the under-designed or non-engineered structures. Development of suitable numerical models for estimating the capacity of the structures with appropriate strengthening measures, accurate material modeling of UHPC is crucial. Extensive experimental investigation on UHPC is necessary to develop material models for UHPC is necessary.	
	Home Institute: IIT Mandi Supervisor: Dr Sandip Kumar Saha School/Dept.: SCENE	Host Institute: IIT Jammu Supervisor: Dr Sameer K. Sarma P School/Dept.: Department of Civil Engineering
7.	Developing material model for fatigue behaviour of UHPC in tension	
	UHPC is a new construction material with high compressive and tensile strength. This can be used for regular construction or for strengthening. This project is aimed at developing material model for UHPC in tension under fatigue loads. Dog bone specimen will be tested in tension under fatigue loading to evaluate the tensile capacity and then material model will be developed to predict the behaviour for analytical modelling. The predictions from these models can be used for evaluating the capacity of retrofitted structures.	
	Home Institute: IIT Jammu Supervisor: Dr Sameer Pachalla School/Dept.: Civil Engineering	Host Institute: IIT Mandi Supervisor: Dr Sandip Saha School/Dept.: SCENE



<p>8.</p>	<p>Fabrication of Components by Additive Manufacturing Techniques for Defense applications</p> <p>Additive manufacturing (AM) has recently attracted the attention of strategic areas due to the freedom of creating the component anytime with fewer resources. Hence, with greater deposition rates, the component fabrication through wire arc additive manufacturing (WAAM) can be accomplished in the minimum possible time. Therefore, the intent behind the present research work is to check the feasibility of employing WAAM in fabricating defense components.</p>	
	<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Shiva Sekar</p> <p>School/Dept.: Department of Mechanical Engineering</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Prateek Saxena</p> <p>School/Dept.: SMME</p>
<p>9.</p>	<p>Removal of emerging contaminants in wastewater system through advance technologies: A Decentralized solution for future targeting circular economy</p> <p>The project will be in the domain of decentralized wastewater treatment systems using anaerobic chamber and also exploring the plant biofilters where biosoils could be utilized for naturally remediating the emerging and primary water pollutants. Also, the project aims to address the challenges in meeting the circular economy where the by-products could be valorized to make something productive.</p>	
	<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Pratik Kumar</p> <p>School/Dept.: Civil Engineering (Environmental)</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Harshad Vijay Kulkarni</p> <p>School/Dept.: SCENE</p>
<p>10.</p>	<p>Reconfigurable Intelligent Surfaces for Defence Applications</p> <p>The proposal aims at the design of Reconfigurable intelligent surfaces (RIS) at microwave frequency bands. The Reconfigurable intelligent surfaces (RIS), a device made of low-cost meta-surfaces that can reflect or refract the signals in the desired manner, have the immense ability to enhance the data transmission from the sender to the receiver. The concept of RIS is inspired by a smart radio environment or programmable radio environment. The introduction of this device in wireless communications aids in reducing the hardware requirements, energy consumption, and signal processing complexity.</p>	
	<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Kushmanda Saurav</p> <p>School/Dept.: Electrical Engineering</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Anirban Sarkar</p> <p>School/Dept.: SCEE</p>
<p>11.</p>	<p>Self-Lubricating Composite for Bearing Application</p> <p>Bearings are critical components in various engineering applications viz. industrial machineries, automotive, aerospace etc. Operating bearings at elevated temperatures involves unique challenges due to increased friction, wear, and lubrication issues. The development of self-lubricating composites for bearing applications at elevated temperatures is of paramount importance for enhancing bearing performance, longevity, and reliability.</p> <p>The proposed research outlines a comprehensive investigation into the development and characterization of a self-lubricating composite material for bearing applications at elevated temperatures. The proposed research aims to explore the tribological behavior, mechanical properties, and fatigue strength of the composite. Additionally, it will involve multi-scale modeling to understand the constituent and thermo-mechanical effects on material strength.</p> <p>This research aims to contribute to advancements in mechanical design engineering, with potential applications of experimental characterization and finite element modelling computational tool.</p>	
	<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Arvind Kumar Rajput</p> <p>School/Dept.: Department of Mechanical Engineering,</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr Himanshu Pathak</p> <p>School/Dept.: SMME</p>



<p>12.</p>	<p>Asymmetric Synthesis of Functional Molecules for Applications as Organocatalysts and Advanced Molecular Motors</p> <p>Non-superimposable mirror image or chiral molecules are the key components of drugs, bioactive compounds, biomacromolecules, natural products and many more functional materials. Other invaluable applications of these chiral molecules are found in chiral catalysis and molecular motors. Due to the significant importance, both the latter areas have been recognized for nobel prizes three times in this millennium. This project will focus on developing synthetic methodology leading to unique stereo-pure molecules, which will be utilized for future applications as chiral catalysis for new asymmetric transformations. These molecules will also be investigated for their applications in thermal and photochemical advanced molecular motors and molecular machines.</p>
<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Pankaj Chauhan</p> <p>School/Dept.: Chemistry</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Abhimanew Dhir</p> <p>School/Dept.: SCS</p>
<p>13.</p>	<p>Design and Development of Non-Innocent Ligand Containing 3d Transition Metal Complexes and Their Catalytic Applications</p> <p>Redox non-innocent ligand(s) containing 3d-transition metal complexes have been found to be promising for developing efficient, cost-effective, and sustainable catalytic protocols. In view of this, we are interested in working on a project aiming at the design and development of redox non-innocent azo-aromatic and related ligands containing 3d-transition metal catalysts. The project will involve synthesis, geometric characterizations, electronic structure analysis, and spectroscopic properties of the electron transfer series of the designed complexes. Subsequently, the complexes will be explored for catalytic applications, with a major focus on alcohol dehydrogenation-triggered organic synthesis and small molecule activation reaction. Overall, the project will involve rigorous synthesis, spectroscopic measurements, and theoretical calculations. The PI from IIT Jammu will perform the major experimental works and the PI of IIT Mandi will be doing the theoretical calculations.</p>
<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Subhas Samanta</p> <p>School/Dept.: Department of Chemistry</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Bhaskar Mondal</p> <p>School/Dept.: SCS</p>
<p>14.</p>	<p>Assessing the impact of urbanization dynamics on natural hazards in the west-central Himalayas</p> <p>Urbanization, particularly in peri-urban areas of the Himalayas, often results in critically transforming the regional land use and land cover (LULC), leading to an increased risk of natural hazards that are already exacerbated by climate change. The proposed study involves investigations of various approaches for analyzing the impact assessment of urbanization in critical areas of the west-central Himalayas on natural hazards, including floods and land subsidence, while simultaneously providing insights for planning authorities towards possible solutions through a decision support framework.</p>
<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Divyesh Varade</p> <p>School/Dept.: Department of Civil Engineering</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Vivek Gupta</p> <p>School/Dept.: SCENE</p>
<p>15.</p>	<p>Seismic vulnerability of tunnels in himalayan region</p> <p>Underground tunnels in the northern and northwestern Himalayas are most commonly found in higher seismic zone regions. Moreover, the construction of these tunnels is primarily challenged by the presence of highly variable geological characteristics. The rocks and soils in this area have been observed to exhibit spatial variability, which can have an impact on both the design and construction phases. A clear understanding of their material characterization and their response to seismic loading conditions is essential. Existing literature has predominantly considered the presence of discontinuities as fully persistent rather than non-persistent, making the growth of cracks and failure modes more complex compared to simple shear slip failure. The present study aims to comprehend the failure behavior of rock with non-persistent discontinuities under seismic loading conditions, taking into account various geometric configurations, and to develop a suitable material model to simulate the cracking behavior.</p>
<p>Home Institute: IIT Jammu</p>	<p>Host Institute: IIT Mandi</p>



	<p>Supervisor: Dr Sivakumar G</p> <p>School/Dept.: Department of Civil Engineering</p>	<p>Supervisor: Dr Prasanna R</p> <p>School/Dept.: SCENE</p>
16.	<p>Submodular Function Maximization with Differential Privacy</p> <p>Many computational tasks in the domain of data mining, machine learning, social network analysis, wireless sensor network, etc. can be modeled as a maximization of a sub-modular function with different constraints (e.g., cardinality constraint, knapsack constraint, matroid constraint, etc.). In many cases, the underlying dataset contains many confidential information (e.g., age, disease, location information of a person). Hence, such datasets are shared with some differential privacy constraints. In this project, our goal is to develop efficient algorithms to maximize submodular functions with differential privacy constraints. Also, we will use real-life dataset for validation of proposed solution approaches.</p>	
	<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Suman Banerjee</p> <p>School/Dept.: Computer Science and Engineering</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Manoj Thakur</p> <p>School/Dept.: SMME</p>
17.	<p>Performance Analysis of Simultaneously Transmitting And Reflecting (STAR) RIS Aided Wireless Communications</p> <p>The novel concept of simultaneously transmitting and reflecting (STAR) reconfigurable intelligent surfaces (RISs) will be investigated under this project, where the incident wireless signal is divided into transmitted and reflected signals passing into both sides of the space surrounding the surface, thus facilitating a full-space manipulation of signal propagation. A base-station (BS) transmits information to the cell-edge users which are assisted by the STAR RIS in such a way that two users, one placed in front of and other behind the RIS, are served by reflection and transmission, respectively. The energy splitting (ES) and mode switching (MS) configurations of the STAR RIS are considered for analysis. For infinite block-length transmission, the expressions for outage probability and channel capacity will be derived, whereas for finite block-length transmission, the expressions for block error rate, system goodput and channel capacity will be derived. To get further insights, the expression for asymptotic outage probability is also derived. Furthermore, the effects of various parameters, including reflection coefficients, inter-element spacing, distances between STAR RIS and users, finite block-length parameters, imperfect channel state information (CSI), etc., are to be examined.</p>	
	<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Ajay Singh</p> <p>School/Dept.: Department of Electrical Engineering</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr. Samar Agnihotri</p> <p>School/Dept.: SCEE</p>
18.	<p>Development of advanced carbon materials for Na ion battery cathode</p> <p>The high cost and scarcity of lithium are driving research to develop alternatives to lithium-ion batteries, especially to meet future needs in energy storage. Sodium-ion batteries represent a possible alternative, in large part because of sodium's low cost and natural abundance. However, critical advances are needed for sodium-ion technology to fulfil its promise. Lithium-ion batteries are used widely in products from consumer electronics to electric vehicles. However, the need for alternatives is being driven by new and expanding applications including batteries to store power from sources such as solar and wind energy for use on the power grid.</p> <p>Both Li-ion and Na-ion batteries typically utilize graphite and graphitic carbons as their cathode material. The intercalation of Li ion in such carbons is relatively easy, given the spacing between the basal planes of carbon facilitates can conveniently accommodate Li ions. The same is not the case with Na, owing to its larger size as well as chemical properties. In the last one decade, the research focus is therefore shifted towards the development of new and advanced carbon materials with an optimum layer-spacing (slightly larger than that used in Li-ion batteries) as well as the right fraction of point defects.</p> <p>The goal of the proposed project is to develop such carbon materials (IIT Mandi) and test their electrochemical properties (IIT Jammu) specifically for Na ion battery applications. Following this, complete devices, including coin cells and flexible, device-friendly batteries will be fabricated and tested. Further investigation on Na⁺ solvent co-intercalation and optimization of electrodes and electrolyte solution is necessary for to realize the practical use of Na-ion batteries.</p>	
	<p>Home Institute: IIT Jammu</p> <p>Supervisor: Dr. Ravi Kumar Arun</p> <p>School/Dept.: School of chemical Engineering</p>	<p>Host Institute: IIT Mandi</p> <p>Supervisor: Dr Swati sharma</p> <p>School/Dept.: SMME</p>



General Qualifications

In the present call, the students for the PhD JDP will be admitted only in the Regular category. An eligible student in this category works full-time and receives assistantship from the Institute.

The candidate should fulfil the minimum eligibility criteria of the Home institution of the respective projects as mentioned in the below link.

IIT Mandi : <https://cloud.iitmandi.ac.in/f/abee554e7294407399ce/>

IIT Jammu: <https://iitjammu.ac.in/Programme/phdadmissions/2023-24/PhD%20Advertisement%20Special%20Drive.pdf>

In addition to general eligibility criterion, the applicants must also satisfy the eligibility criteria specified for the respective Projects/Departments / Centres / Schools / Interdisciplinary Groups. Over and above the general eligibility criteria for admission, candidates need to satisfy additional criteria for financial support / fellowship, as specified under specific admission categories.

The final selection process to Ph.D. JDP programme for any project will be through written test and/or interview.

Application and Admissions

The admissions process will be managed by the IIT Mandi - IIT Jammu Joint Admissions Sub-committee (JASC) constituted at the School/Department/Centre level and according to each Institution's admissions procedure. Candidates must meet the admissions requirements of both institutions. The eligibility criteria for enrolling in a joint PhD program will be same as that of a regular PhD program/ERP of the individual institute. The details of the same can be found in the PhD ordinance of the individual institute.

- IIT Mandi https://www.iitmandi.ac.in/pdf/ordinances/Ordinances_phd_mtech.pdf
- IIT Jammu <https://iitjammu.ac.in/academics/academics-rules-and-regulations>

All applicants will be expected to apply through an online admissions portal.

Fees, Scholarships and Funding

- The JDP Scholar shall pay tuition fees only to their Home Institution throughout the duration of the JDP including the duration of study at the Partner Institution as per its fee structure.



- Unless otherwise indicated, candidates who wish to be admitted onto the PhD JDP are entitled to receive fellowship meeting the eligibility criteria. The cost of fellowship will be borne by the Home Institute even during the candidate's stay in the Host Institute. No tuition fee will be charged by the host institution. However, the student needs to bear the boarding and lodging charges. Scholarships are awarded based on merit, and the value and conditions of any scholarship awarded will be in accordance with the terms and conditions of the awarding institution.
- Regardless of the scholarship awarded, students on the joint PhD program will be personally responsible for the following expenses unless otherwise advised:
 - Incidental fees and charges at either institution
 - Accommodation and living expenses at either institution
 - All personal expenses and non-compulsory additional fees at the host institution
 - All debts incurred by candidates during their stay at either institution
 - Any other debts incurred by candidates during the Joint PhD Program
 - Further the grants in respect of attending conferences will be provided only by the home institute.

Fees details:

The selected candidate needs to pay the fee only to the Home institution and the details about the fee structure can be found below:

- IIT Mandi <https://cloud.iitmandi.ac.in/f/248b95f143c8484c9a83/>
- IIT Jammu <https://www.iitjammu.ac.in/fee>
