भारतीय प्रौद्योगिकी संस्थान मण्डी

Indian Institute of Technology Mandi

भारतीय प्रौद्योगिकी संस्थान जम्मू

Indian Institute of Technology Jammu

विद्याधनं सर्वधन प्रधानम्

IIT Mandi - IIT Jammu
PhD Joint Degree Program

Information Brochure

Admissions 2024-2025

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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/icollecthome.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 2023-25 by the Competent Authority in the prescribed format must be uploaded in the ONLIINE application form. ***(certificate issued after 31st April,2024)***
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. ***(Certificate issued after 31st April,2024)***

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	24th May, 2024
Last date for filling Online Application	12th June, 2024
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	sceeoffice@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	01905-267786
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
Centre for Quantum Science and Technologies (CQST)	arvindthapliyal@iitmandi.ac.in	01905-267899
Centre for Human Computer Interaction (CHCI)	chcioffice@iitmandi.ac.in	01905- 267187

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:

<table>
<tr><td rowspan="2">1.</td><td colspan="2">On-chip Radiation Hardened In-Memory Computing for Edge device applications

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.

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.</td></tr>
<tr><td>Home Institute: IIT Mandi

Supervisor: Dr. Hitesh Shrimali

School/Dept.: SCEE</td><td>Host Institute: IIT Jammu

Supervisor: Dr. Ambika Prasad Shah

School/Dept.: Department of Electrical Engineering</td></tr>
<tr><td rowspan="2">2.</td><td colspan="2">Colloid facliated contaminant transport through porous media

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.</td></tr>
<tr><td>Home Institute: IIT Mandi

Supervisor: Dr Deepak Swami

School/Dept.:SCENE</td><td>Host Institute: IIT Jammu

Supervisor: Dr Nitin Joshi

School/Dept.:Civil Engineering Department</td></tr>
<tr><td rowspan="2">3.</td><td colspan="2">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.</td></tr>
<tr><td>Home Institute: IIT Mandi

Supervisor: Dr Sandip Kumar Saha

School/Dept.: SCENE</td><td>Host Institute: IIT Jammu

Supervisor: Dr Sameer K. Sarma P

School/Dept.: Department of Civil Engineering</td></tr>
</table>

4. **Additive manufacturing of nickel superalloy bulk structures for extreme applications:**

The primary material of choice for turbine engines is nickel-based superalloy due to its exceptional strength, extended fatigue life, and excellent resistance to oxidation and corrosion under high temperature conditions. The material preferred for the most heat-resistant engine parts that need to function at temperatures over 800°C is a superalloy made primarily of nickel. Nickel superalloys exhibit exceptional resistance to creep, enabling their utilisation at temperatures as high as 850°C. Among the various available options in additive manufacturing techniques, submerged arc additive manufacturing (SAAM) is less explored. SAAM-made metallic alloys exhibit distinct characteristics compared to materials created using conventional methods, including welds, and materials fabricated using other additive manufacturing techniques. Hence, the current research will explore the possibilities of fabricating Ni based superalloys for extreme-condition applications using SAAM.

Home Institute: IIT Mandi	**Host Institute: IIT Jammu**
Supervisor: Dr. Prateek Saxena	**Supervisor: Dr. Shiva Sekar**
School/Dept.: SMME	**School/Dept.: Mechanical Engineering**

5. Spatio-Temporal Variability of Soil Moisture and Associated Flash Drought in Lower Himalayan Region: Assessment and Application:

Information of soil moisture and its variability have wide application in agriculture and crop management, smart and IOT based irrigation methods, drought monitoring etc. The soil moisture measurement using conventional in-situ methods are precise but requires significant time and efforts, therefore are not carried out at watershed scale (>100 sq km). The temporal and spatial variability of soil moisture is highly nonlinear and are region specific and varies with geology, topography, land use-land cover, seasonal weather, soil texture and their simultaneous interactions. Although the individual effects of physical controls have been reported in literature, their interaction or combined effects are poorly understood. The climate and agricultural practices in the Himalayan regions are very contrasting as compared to the other part of the country. Considering the scarcity of land resources in the Himalayan region, the understanding of soil moisture and associated effects of climatic factors becomes of immense importance. There is not a single study is available which understands soil moisture spatio-temporal variability at the watershed scale in the Himalayan region. Therefore, in this study we propose to conduct intensive monitoring of soil moisture monitoring in Suketi watershed to identify the spatio-temporal variations of soil moisture and the interactive effect of physical controls. The proposed study will identify the key driving physical factor and their interaction affecting soil moisture variability for the lower Himalayan watershed (400 sq km area). An extensive field campaign (2-year duration) would be carried out to collect the high-quality soil moisture and soil properties dataset at 4 km2 grid. The data would then be analyzed to identify the minimum number of number of required locations (NRL) necessary to estimate the mean soil moisture with acceptable level of uncertainty. The temporal stability for spatial soil moisture pattern at watershed scale would also be analyzed. This study will build a soil moisture database covering different soil texture class, LULC and elevation (700 m-2300 m). This dense network of soil moisture in the watershed, will be further utilized to understand the soil moisture deficit causing flash drought and to validate the satellite-based soil moisture product. Considering the heavy dependability on rain-fed irrigation practices in the region, soil moisture deficit can potentially lead to flash droughts which adversely affects the food and water security of the region. Hence, detection of flash drought events becomes crucial for regional drought mitigation. Every time collecting the long-term time series data, of this magnitude, is a formidable task as in-situ sensors typically measures soil moisture within a very small volume (< 0.5 m3-1 m3). Given the recurrence of flash drought and its societal impact, a long time series data is required to identify these trends, however the same can be achieved through a remotely sensed satellite data after calibration and validating (Cal/Val) with the ground-based observations. Ground truthing of remotely sensed satellite-based data will be done through dense dataset of volumetric soil moisture (VSM) measurements. Post Cal/Val, the corrected data will then be utilized for the 30-day advance time scale prediction of flash drought events using Flash Drought Stress Index (FDSI). The project will conclude with outlining the guidelines for designing soil moisture field campaigns, developing an effective soil moisture monitoring network in lower Himalayan watershed, demonstrating the utilization of observed data in cal/val of satellite based soil moisture observation and to predict the flash drought. Additionally The dataset will be of immense use for many applications, beyond what elaborated above.

Home Institute: IIT Jammu	**Host Institute: IIT Mandi**
Supervisor: Dr. Nitin Joshi	**Supervisor: Dr. Deepak Swami**
School/Dept.: Civil Department	**School/Dept.: SCENE**

6.	**Design and Development of Non-Innocent Ligand Containing 3d Transition Metal Complexes and Their Catalytic Applications.**	
	Home Institute: IIT Jammu **Supervisor: Dr. Subhas Samanta** **School/Dept.: Department of Chemistry**	**Host Institute: IIT Mandi** **Supervisor: Dr. Bhaskar Mondal** **School/Dept.: School of Chemical Sciences**
7.	**Analysing the impact of urbanization dynamics on natural hazards in west-central Himalayas**	
	Home Institute: IIT Jammu **Supervisor: Dr. Divyesh Varade** **School/Dept.: Department of Civil Engineering**	**Host Institute: IIT Mandi** **Supervisor: Dr. Vivek Gupta** **School/Dept.: School of Civil & Environmental Engineering**
8.	**Developing material model for fatigue behaviour of UHPC in tension**	
	Home Institute: IIT Jammu **Supervisor: Dr Sameer K. Sarma P** **School/Dept.: Department of Civil Engineering**	**Host Institute: IIT Mandi** **Supervisor: Dr Sandip Kumar Saha** **School/Dept.: School of Civil & Environmental Engineering**
9.	**Design and Development of GFMs control for a DFIG driven wind turbine, an aggregated Evs and BESS**	
	Home Institute: IIT Jammu **Supervisor: Dr. Anup Shukla** **School/Dept.: Department of Electrical Engineering**	**Host Institute: IIT Mandi** **Supervisor: Dr. Himanshu Misra** **School/Dept.: School of Computing and Electrical Engineering**
10.	**Speech inteligibilty and Quality Improvement via Lombard Speech Conversion in Deep Neural Network and Machine Learning Framework**	
	Home Institute: IIT Jammu **Supervisor: Dr. Karan Nathwani** **School/Dept.: Department of Electrical Engineering**	**Host Institute: IIT Mandi** **Supervisor: Dr. Padmanabhan Rajan** **School/Dept.: School of Computing and Electrical Engineering**
11.	**Passivity Based Multi-Quadrotor Control for Varying Payload**	
	Home Institute: IIT Jammu **Supervisor: Dr. Padmini Singh** **School/Dept.: Department of Electrical Engineering**	**Host Institute: IIT Mandi** **Supervisor: Dr. Tushar Jain** **School/Dept.: School of Computing and Electrical Engineering**
12.	**Development of VLSI Algorithm, Digital Architecture, FPGA-Emulation and ASIC -Chip Fabrication of Sub-Nyquist Based Wideband Spectrum Sensing with Compressed Sensing for Cognitive Radio Network.**	
	Home Institute: IIT Jammu **Supervisor: Dr. Rohit Chaurasiya** **School/Dept.: Department of Electrical Engineering**	**Host Institute: IIT Mandi** **Supervisor: Dr. Rahul Shrestha** **School/Dept.: School of Computing and Electrical Engineering**
13.	**Development of advanced carbon materials for Na ion battery cathode**	
	Home Institute: IIT Jammu **Supervisor: Dr Ravi Kumar Arun** **School/Dept.: Department of Chemical Engineering**	**Host Institute: IIT Mandi** **Supervisor: Dr Swati Sharma** **School/Dept.: School of Mechanical and Materials Engineering**

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/ebee554e7294407399ce/

IIT Jammu: https://iitjammu.ac.in/Programme/phdadmissions/2023-24/PhD%20Advertisment%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://www.iitmandi.ac.in/fees.php
- **IIT Jammu** https://www.iitjammu.ac.in/fee

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