IIT PALAKKAD

Nurturing Minds for a Better World

Research Admissions

Indian Institute of Technology Palakkad

July 2022

Information Brochure

CONTENTS

1. Important Dates
2. Important Guidelines for MS (by Research) and PhD Application
3. The Institute
4. Departments/Centres and Research Areas at IIT Palakkad
   - 4.1. Biological Sciences and Engineering
   - 4.2. Chemistry
   - 4.3. Civil Engineering
   - 4.4. Computer Science and Engineering
   - 4.5. Data Science
   - 4.6. Electrical Engineering
   - 4.7. Humanities and Social Sciences
   - 4.8. Mathematics
   - 4.9. Mechanical Engineering
   - 4.10. Physics
   - 4.11. Environmental Sciences & Sustainable Engineering Centre (ESSENCE)
5. Central Research Facilities
   - 5.1. Central Instrumentation Facility (CIF)
   - 5.2. Central Micro-Nano Fabrication Facility (CMFF)
   - 5.3. Central Facility for Materials and Manufacturing Engineering (CFMM)
   - 5.4. High Performance Computing Cluster
6. MS and PhD admissions
   - 6.1. Application
   - 6.2. Financial Assistance
   - 6.3. Minimum Eligibility
     - 6.3.1. MS
     - 6.3.2. PhD
     - 6.3.3. Institute Staff Members or Research Scholars under External Registration.
   - 6.4. Selection Procedure
   - 6.5. Interview
   - 6.6. Reservation of Seats
   - 6.7. Verification of Certificates
7. Fees, Deposits and Refund Policy
   - 7.1. Fees and Deposits
   - 7.2. Refund Policy
8. Institute Library
9. Career Development Centre
10. Hostel Facilities
11. MITRA: Wellness Hub
12. Appendices

1. Important Dates[1]

Advertisement to Appear	01 April 2022
Application Portal Opens	01 April 2022
Last date for submission of application online	30 April 2022
Shortlist to appear	On or before 25 May 2022
Interview dates	During 01 June – 30 June 2022
Selection list to appear	10 July 2022
Date of Admission	To be announced

2. Important Guidelines for MS (by Research) and PhD Application

i	Please read the instructions given in the admission brochure carefully before filling up the application form.
ii	Online application form is available at the Institute website resap.iitpkd.ac.in. After filling the form, please take a printout and keep it for records.
iii	The application fee is as follows: GN/OBC-NCL/EWS Male candidates: Rs.100/- GN/OBC-NCL/EWS Female candidates: Rs.50/- SC/ST and PwD candidates: Rs.50/- APPLICATION FEE IS NON-REFUNDABLE
iv	A valid OBC-NCL /EWS certificate must be uploaded with the ONLINE application and submitted at the time of admission
v	You should check the IIT website for important announcements and the results

[1] Any changes in dates will be notified on the institute website.

3. The Institute

The Indian Institute of Technology Palakkad (IIT Palakkad) is an autonomous institute of national importance established in 2015 by the Government of India as one of the third generation IITs. IIT Palakkad conducts undergraduate academic program of B. Tech, postgraduate course programs of M. Tech and M. Sc. and research programs leading to M.S and Ph. D. in various disciplines.

Main Entrance to the Nila campus (Transit facilities)

Presently the programs are conducted one half in the temporary campus of Ahalia International Foundation and the other half in the Nila campus which houses the transit facilities at the permanent campus site at Pudussery. The permanent campus is about 7 km from Palakkad in the Palakkad-Coimbatore highway. The scenically charming sprawling permanent campus is now being developed into an excellent and modern technological campus. As of now, the Institute is proud of its fast growth in terms of very qualified and committed faculties and staff, well equipped laboratories, excellent computing infrastructure, well stacked library and a brilliant student community.

4. Departments/Centres and Research Areas at IIT Palakkad

All the departments/disciplines of the Institute started functioning in August 2015. B.Tech programs in the four disciplines of Civil Engineering, Computer Science and Engineering, Electrical Engineering and Mechanical Engineering started in 2015. Research programs leading to MS and PhD commenced in August 2017. Major highlights of the different departments/centres, research areas and research facilities are given below.

Ahalia Campus

4.1. Biological Sciences & Engineering

The Faculty

1. Prof. Jagadeesh Bayry, PhD (Sorbonne University Paris)
2. Dr. Abdul Rasheed P, PhD (NIT Calicut)
3. Dr. Bibhu Ranjan Sarangi, PhD (RRI Bangalore)
4. Dr. Sushabhan Sadhukhan, PhD (Case Western Reserve University, USA)

Biological Sciences and Engineering (BSE) Department at Indian Institute of Technology Palakkad aims at interdisciplinary biomedical research and biotechnology to improve human and animal health under 'One Health' concept.

The current focus of the department is on

1. Human pathophysiology
2. Host-pathogen interaction
3. Diagnosis of diseases
4. Biophysics

The department will be expanded during the coming years with relevant expertise in diverse areas of biomedical research. Together, our aim is to develop a strong and dynamic scientific community that performs cutting edge research and educational activities through Academic-Industry-Health Care Systems partnerships to improve human and animal health.

Programs

PhD Program in Biological Sciences & Engineering: We are currently offering a PhD program. The members of the Department are engaged in cutting edge research in different domains of Biomedical Research as depicted above.

Facilities

Excellent state-of-the-art research facility is coming up at Nila Campus (transit campus) of the Institute and we are in the process of acquiring several key instruments for the department. Other commonly used instruments like confocal microscope, fluorescence microscope, fluorescence spectrophotometer, UV spectrophotometer, liquid chromatography–mass spectrometry and others are already available either at the Institute central facility or in other departments. The Institute Ethics committee for the research involving humans is in place.

4.2. Chemistry

The Faculty

1. Dr. Debarati Chatterjee, PhD (IISc, Bangalore)
2. Dr. Dinesh Jagadeesan, PhD (JNCASR, Bangalore)
3. Dr. Mintu Porel, PhD (University of Miami, USA)
4. Dr. Padmesh A, PhD (Massey University, New Zealand)
5. Dr. Priyakumari C P, (Inspire Faculty), PhD (IISER TVM)
6. Dr. Supratik Sen Mojumdar, PhD (IACS, Kolkata)
7. Dr. Sushabhan Sadhukhan PhD (Case Western Reserve University, USA)
8. Dr. Shanmugaraju Sankarasekaran, PhD (IISc Bangalore)
9. Dr. Rositha Kuniyil, PhD (Institut Català d'Investigació Química (ICIQ), Spain)
10. Dr. Abdul Rasheed P (DBT Ramalingaswami Fellow), PhD (NIT Calicut)

In the initial years from 2015, the Discipline of Chemistry was involved in instructional work of the B.Tech courses. In July 2017, the department took a leap to start its PhD program and in 2019 it started the M. Sc. program. Currently, a total of 19 PhD scholars and 3 postdoctoral fellows are working in various areas of theoretical and experimental chemistry under the guidance of the highly motivated faculty of the department.

Research Areas

- Fundamentals studies on biophysical chemistry
- Molecular dynamics simulations
- Mechanochemistry
- Equilibrium and non-equilibrium statistical mechanics of soft matter
- Structure and dynamics of the biopolymers / macromolecules
- Materials chemistry and heterogeneous catalysis
- Organic macromolecules - design, synthesis and applications in material and biomedical sciences
- Self-assembly formation of discrete supramolecular ensembles and study of their functional applications
- Engineering mesoporous polymers for selective adsorption and sequestration of pollutants/ hazardous substances

- Fabrication of functional nano-structures for bio-medicine
- Design, synthesis and development of novel molecular entities for targeted therapy
- Bio-orthogonal chemistry in drug discovery
- Computational catalysis and small molecule activation
- In silico design of novel organo- and transition metal catalytic systems and artificial metalloenzymes
- Single molecule spectroscopy to study protein dynamics

Research Areas Available for Admission in July 2022

- Physical Chemistry
- Computational Chemistry
- Chemical Biology
- Organic Chemistry

Facilities

The department of Chemistry has well equipped laboratories that have basic and sophisticated equipment to carry out high quality teaching and research. They include

- Work benches
- Analytical balances
- Benchtop conductivity meter
- Benchtop pH meter,
- Digital colorimeter with micro control and 8 filters
- Ice flake machine
- Melting point apparatus
- Spectrophotometer
- Ultrasonic bath
- UV-vis spectrophotometer
- Fluorescence spectrophotometer
- Microwave reactor
- Cyclic Voltammeters
- Physisorption
- Optical microscope
- Polarimeter
- Bomb Calorimeter
- Electrophoresis
- Ovens
- High temperature furnaces
- Chemical Vapour deposition system

In addition to this, IIT Palakkad has set up different central facilities for experimental and theoretical studies such as the Chandra High Performance Computing Cluster, Central Instrumentation Facility (CIF), and Central Micro-Nano Fabrication Facility (CMFF). As a part of central facilities, sophisticated instruments (relevant to the field of chemistry) such as High-performance liquid chromatography (HPLC), Liquid Chromatography-Mass Spectrometry (LC-MS), Thermal Gravimetry Analysis - Mass spectrometer (TG-MS), Gas Chromatograph, FT-IR, Raman, X-ray diffractometer, Chemisorption analyzer, NMR, UV-vis spectrophotometer, Scanning Electron Microscope, Confocal Microscope and Fluorescence spectrophotometers are available for the research.

UG / PG Lab of the discipline of Chemistry

4.3. Civil Engineering

The Faculty

1. Dr. Anil Kumar M V, PhD (IIT Madras)
2. Dr. Athira P, PhD (IIT Madras)
3. Dr. Arun C. O, PhD (IIT Madras)
4. Dr. B K Bhavathrathan, PhD (IIT Bombay)
5. Dr. C V Veena Venudharan, PhD (IIT Kharagpur)
6. Dr. Deepak Jaiswal, PhD (Pennsylvania State University, USA)

7. Dr. Divya P V, PhD (IIT Bombay)
8. Dr. Gokulnath C, PhD (IIT Madras)
9. Dr. Madhu Karthik M, PhD (Texas A&M University, USA)
10. Dr. Praveena Gangadharan, PhD (IIT Madras)
11. Dr. Rakesh J Pillai, PhD (IIT Madras)
12. Dr. Sanjukta Chakraborty, PhD (IIT Kanpur)
13. Dr. Sarmistha Singh, PhD (Auburn University)
14. Dr. Senthilkumar V, PhD (IIT Madras)
15. Dr. Subhasis Mitra, PhD (Auburn University, USA)
16. Dr. Sudheesh T K, PhD (The University of Florida, USA)
17. Dr. Sunitha K Nayar, PhD (IIT Madras)

Civil Engineering is one of the four B.Tech programs that is being offered at IIT Palakkad since its inception in 2015. PhD and MS programs in Civil Engineering are offered with specializations in Building Materials, Construction Management, Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Transportation Engineering and Environmental Engineering. The Discipline of Civil Engineering started offering a two-year M.Tech. program with a specialisation in Geotechnical Engineering in the academic year 2019-20. In a short span of four years, the Civil Engineering stream has successfully set up all basic labs for the B.Tech program. In addition, several advanced labs have also been set up for use of the undergraduate and postgraduate students and to execute research projects.

The faculty members in Civil Engineering come with academic training and experience from various reputed institutes in India and abroad. The diverse background of the faculty helps to bring in different perspectives to teaching and research to the students in Civil Engineering.

Research Areas

- **Building Materials:** Performance assessment and optimization of special concretes for structural systems such as FRC & SCC; development of design methodologies for structural systems using high performance concrete; sustainable building materials
- **Construction Engineering and Management:** IT Application in Construction Automation, Design Management, Lean Construction, Reality Modeling and BIM Applications in Construction Management, Policy Making in Infrastructure Project Delivery.
- **Environmental Engineering:** Water and wastewater treatment; microbial fuel cells; electrochemical treatment techniques
- **Geotechnical Engineering:** Experimental Geotechnics, Physical modelling in Geotechnical Engineering, Deep Foundations, Soil Stabilization and Ground Improvement Methods, Geosynthetics and Reinforced Earth, Geo-Environmental Engineering, Cyclic Behaviour of Soils, Computational Methods in Geotechnical Engineering, Landslides and slope stability, constitutive modeling in geomechanics.
- **Structural Engineering:** Steel structures, Reinforced and prestressed concrete structures,

Steel-concrete composite structures, Structural evaluation of deteriorated structures, adaptive passive control, optimal feedback control and related study on stability, robustness, time delay, testing protocol to reproduce the prototype behavior, Constitutive modelling, Continuum mechanics, Experimental mechanics, Stochastic analysis, Computational structural mechanics, Structural reliability, Meshfree method, Fragility analysis

- **Transportation Engineering:** Transportation Planning; Traffic Flow Modelling and Simulation; Traffic Safety; Pavement Materials; Pavement Design; Pavement Evaluation; Pavement Management Systems
- **Water Resources Engineering:** Climate change and climate variability impacts on water resources and crop production; Study and forecasting of extreme events; Nonpoint source pollution analysis; Hydrologic and water quality modelling; Forecasting of water resources; Integrated water resources management

Some basic laboratory equipment

The faculty members of Civil Engineering are also actively involved in sponsored and consultancy projects to provide working solutions to problems faced by industry and society. The sponsoring agencies include central and state departments and private organizations like Department of Science and Technology (DST), Vigilance and Forest Intelligence, Kerala Public Works Department, National Mission on Himalayan Studies, Kerala State Council for Science, Technology and Environment, Techfab India Industries Ltd. etc. The consultancy services are offered to different agencies like Military Engineering Services (MES), Palakkad Municipality, Fumace Fabrica India Ltd., Kerala PWD, Central PWD, Durafloor Concrete Solutions, Emad

Engineering Enterprises, EKK Infrastructure Ltd., Flatworx Consulting, BPCL, IOCL, Kerala Water Authority, KIIFB, Airport Authority of India (AAI) etc.

Apart from the scholastic activities, the students, staff, and faculty members in Civil Engineering are actively involved in several outreach programs such as Unnat Bharat Abhiyan, clean energy and clean water campaign, national science day, and Vigyan Jyothi to name a few.

Research Areas Available for Admission in July 2022

- Hydroclimatology
- Structural Engineering/Computational Structural Mechanics
- Water Resources Engineering
- Construction Management

Exceptional Ph.D. applicants meeting the appropriate criteria can be supported by Ph.D. fellowship from the following sponsored research projects funded by various agencies.

1. **Development of a River Basin Management Plan for the Bharathapuzha River Basin**

   Principal Investigator : Dr. Sarmistha Singh

   Co PIs : Dr. Athira P and Subhasis Mitra

   Project No : 2022-045-CE-ATP-IDRB-CP

   Funding Agency : Irrigation and Design Research Board, Department of Water Resources

2. **Design of a Cyber-Physical System for Supporting Decision Making in Smart City Infrastructure Management**

   Principal Investigator : Dr. V. Senthilkumar

   Project No : DST/GITA - India - Taiwan Programme of Cooperation in S&T: CFP 2021 :: 2021TW0201036

   Funding Agency : DST GITA

Facilities

- **Structural Engineering**: 100 kN and 500 kN Servo Hydraulic Universal Testing Machines; Actuators:100 kN, 250 kN, and 500 kN; 2D and 3D testing frames; data acquisition systems, Load Controlled UTMs :300 kN and 3000 kN, Speed Control motor Material characterization: Servo hydraulic compression/flexural testing system 3000kN, 300 kN, 100 kN, 15 kN; SCC testing
- **General computational facilities**: Various analysis and design Software, Finite Element Method software, Spatial data analysis Software, and High-performance computing cluster of the Institute.

- **General workshop**: Lathe, milling, grinding and drilling machines, welding, power tools etc.
- **Transportation Systems:** PTV Vissim, PTV Visum, Cube Analyst, Synchronous video cum GPS logger, ArcGIS
- **Pavement Engineering:** (1) Conventional Bitumen Tests, (2) Aggregate Tests, (3) Bituminous Mix Design, & (4) Performance Characterization
- **Environmental Engineering:** (1) UV Spectrophotometer (2) TOC Analyzer (3) Multi-Channel Potentiostat.
- **Geotechnical Engineering:** (1) Fully automated static triaxial system, (2) Computerised cyclic triaxial system, (3) Computerised flexible wall permeability system (4) Automated consolidation test apparatus, (5) Computer controlled direct shear test setup, (6) Fully automated soil-geosynthetic interface shear resistance testing apparatus, (7) CBR Test apparatus, and (8) all the basic equipment for soil characterization.

Some advanced laboratory equipment

4.4. Computer Science and Engineering

The Faculty

1. Dr. Albert Sunny, PhD (IISc Bangalore)
2. Dr. Deepak Rajendraprasad, PhD (IISc Bangalore)

3. Dr. Jasine Babu, PhD (IISc Bangalore)
4. Dr. Krithika Ramaswamy, PhD (IIT Madras)
5. Dr. Krishnamoorthy Dinesh, PhD (IIT Madras)
6. Dr. Koninika Pal, PhD (Technical University Kaiserslautern)
7. Dr. Piyush P Kurur, PhD (IMSc Chennai)
8. Dr. Sahely Bhadra, PhD (IISc Bangalore)
9. Dr. Sandeep Chandran, PhD (IIT Delhi)
10. Dr. Satyajit Das, PhD (University of South Brittany, France, University of Bologna, Italy)
11. Dr. Srimanta Bhattacharya, PhD (Indian Statistical Institute, Kolkata)
12. Dr. Unnikrishnan Cheramangalath, PhD (IISc, Bangalore)
13. Dr. Vivek Chaturvedi, PhD (Florida International University, USA)

The Computer Science and Engineering (CSE) department at the Indian Institute of Technology Palakkad offers undergraduate, graduate, and doctoral programs. The department envisions imparting knowledge across depth and breadth of computer science and engineering. Our programs build a strong foundation in students and prepare them for both cutting-edge technology industry jobs and higher education. We witness a very high percentage of placements every year and many of our students are pursuing higher studies in reputed universities in India and Abroad.

Undergraduate Program

Bachelor of Technology in Computer Science and Engineering

Graduate Programs

1. Master of Science (by Research)
2. Master of Technology in Computing and Mathematics (MCaM), jointly with the Department of Mathematics.
3. Master of Technology in System on Chip Design (SoCD), jointly with the Department of Electrical Engineering
4. Doctor of Philosophy

Research

The core research areas and subareas of the CSE department are listed below.

1. **Theoretical Computer Science**: Algorithms, Complexity Theory, Probabilistic Computing, Graph Theory, Combinatorics, Discrete Mathematics, Computational Algebra, Cryptography.
2. **Programming Languages, Compilers, and Verification**: Programming Languages, Type Theory, Compilers, Program Analysis, Proof Assistants, Formal Verification.

3. **Computer Systems**: Computer Architecture, Electronic Design Automation, Cyber Physical Systems, Reconfigurable Computing, Low power SoC, Systems for AI, High Performance Computing, Operating Systems, Database Systems, Computer Networks, Distributed and Interconnected Systems.

Other associated research areas are Probability Theory, Machine Learning, Natural Language Processing, Computer Vision, and Data Mining.

The CSE faculty members are active in research and continuously engage with industry and academia around the globe. They have active research collaborations with world class Universities such as Nanyang Technological University Singapore, University of Alberta Canada, Aalto University Finland, University of South Brittany France, and University of Bologna Italy to name a few.

Research Areas Available for Admission in July 2022

- Computer Systems: Computer Architecture, Distributed and interconnected systems, High-Performance Computing.
- Programming Languages, Compilers, and Verification: Formal Methods and Verification, Compilers, and Program Analysis.
- Theoretical Computer Science: Complexity Theory, Graph Theory and Combinatorics, Algorithmic Algebra, Pseudorandomness, Cryptography and Data Privacy.

Exceptional Ph.D. applicants meeting the appropriate criteria can be supported by Ph.D. fellowship from the following sponsored research projects funded by various agencies.

1. **Towards Automating Deterministic Bug-reproduction during Post-silicon Validation**

   Principal Investigator : Dr. Sandeep Chandran

   Project No : 2020-050-CSE-SAC-SRC-SP

   Funding Agency : Semiconductor Research Corporation

   The student is required to develop a technique to analyze large volumes of execution traces (TBs in size) to optimize test case generation and minimize bug reproduction time.

Facilities

The facilities at CSE Department include the latest boards and software from ARM, Cadence, Xilinx necessary for developing modern Systems-On-Chip. The central

facilities at the institute includes a HPC Cluster, and a micro-nano device fabrication facility with Class 1 lakh and 10000 clean room, and a characterization facility.

4.5. Data Science

The Faculty

1. Dr. Amrita Roy, PhD (Jawaharlal Nehru University)
2. Dr. Koninika Pal, PhD (Technical University Kaiserslautern)
3. Dr. Lakshmi Narasimhan Theagarajan, PhD (IISc Bangalore)
4. Dr. M. Ashok Kumar, PhD (IISc Bangalore)
5. Dr. Mrinal Kanti Das, PhD (IISc Bangalore)
6. Dr. Narayanan C K, PhD (Arizona State University)
7. Dr. Sahely Bhadra, PhD (IISc Bangalore)
8. Dr. Satyajit Das, PhD (University of South Brittany, France, University of Bologna, Italy)
9. Dr. Swapnil Hingmire (IIT Madras)

The Data Science (DS) department at the Indian Institute of Technology Palakkad began its journey last year. We are currently offering graduate and doctoral programs and going to open an undergraduate program this year. With the vision of providing world-class education and developing data science & artificial intelligence for the benefit of society, we are engaged in a broad range of cutting-edge research in the area of Data Science.

Research Areas

- **AI and Machine learning**: Kernel Learning, Multiview Learning, Robust Optimization and Convex Optimization for Large Data, Anomaly Detection in Time Series, Privacy-aware Learning, Bayesian Model.
- **Systems for AI**: Computer Vision, Architecture for Deep Learning, Energy-efficient and High-performance Systems for Multimedia Applications, Energy-aware Algorithms for Signal Processing to efficient architecture design, Low-power VLSI circuit implementation.
- **Information Retrieval and Natural Language Processing**: Harvesting Knowledge from Text and Web Tables; Knowledge Base Curation, Question-Answering, Text mining, Discourse analysis, Scientific document understanding, Building Smart Indices for Efficient Similarity Search.
- **Information Theory and Statistics**: Statistical Learning and Inference, Federated Learning, Mathematical Statistics.

Research Areas Available for Admission in July 2022

- Machine Learning/Deep Learning
- Artificial Intelligence
- Natural language processing, Text mining

- Information Retrieval, Data Mining
- Computer Vision

Candidates with an eligible degree (based on the minimum eligibility criteria mentioned in section 6.3) in Computer Science/Information Technology/Electronics & Communication Engineering/ Electrical Engineering /Mathematics /Statistics/ Data Science/allied disciplines will be considered for this cycle of PhD and MS admission in the Data Science department .

4.6. Electrical Engineering

The Faculty

1. Prof. Vinod A Prasad, PhD (NTU Singapore)
2. Dr. Anirudh Guha, PhD (IISc Bangalore)
3. Dr. Arun Rahul S, PhD (IISc Bangalore)
4. Dr. Arvind Ajoy, PhD (IIT Madras)
5. Dr. Jobin Francis, PhD (IISc Bangalore)
6. Dr. Lakshmi Narasimhan T, PhD (IISc Bangalore)
7. Dr. Mahesh R Panicker, PhD (NTU, Singapore)
8. Dr. Manas Kumar Jena, PhD (IIT Delhi)
9. Dr. Revathy P, PhD (IISc Bangalore)
10. Dr. Sabarimalai Manikandan (IIT Guwahati)
11. Dr. Shaikshavali Chitraganti, PhD (University of Lorraine, France)
12. Dr. Sneha Gajbhiye, PhD (IIT Bombay)
13. Dr. Sreenath Vijayakumar, PhD (IIT Madras)
14. Dr. Subrahmanyam Mula, PhD (IIT Kharagpur)
15. Dr. Sukomal Dey, PhD (IIT Delhi)
16. Dr. Swaroop Sahoo, PhD (Colorado State University, USA)
17. Dr. Vijay Muralidharan, PhD (IIT Madras)

The Department of Electrical Engineering (EE) at IIT Palakkad offers a vibrant environment for undergraduate, post graduate education and research in many areas of Electrical Engineering. We are a team of 16 faculty members, 180 students and 4 staff members engaged in cutting edge research and teaching in several frontier areas of Electrical Engineering.

Research Areas

- **Biomedical Signal Processing and Imaging**: Research in Brain-Computer Interface Systems, ultrasound imaging, physiological sensing and monitoring, medical imaging.
- **Communication, Information Theory and signal processing**: Wireless communication, design and analysis of next generation cellular systems, cooperative communications, compressed sensing, statistical signal processing (detection and estimation theory), information and coding theory, machine learning for communication.

- **Control and Robotics**: Stability and control issues in networked control systems with/without constraints, Event triggered state estimation with noisy measurements, learning of dynamical systems. Design and development of interesting problems with wheeled, legged, humanoid robots, medical devices, robot vision having a multidisciplinary approach. Stability analysis of Nonlinear Systems, Modeling, analysis, and control design of robotic/aerospace/mechanical systems like unmanned rolling vehicles, underwater vehicles, surface vehicles, aerial vehicles.
- **Digital VLSI Design**: VLSI architectures for real-time signal processing applications, Energy-efficient VLSI Systems for machine learning.
- **Measurements and Instrumentation**: Measurements, sensor design, signal conditioning circuits, embedded systems in instrumentation and measurement, direct digital converters for resistive, capacitive and inductive sensors. Building instruments for measurements on micro-nano electronic devices.
- **Microwave integrated circuits including Antennas, Radar systems, and signal processing**: Microwave remote sensing, remote sensing applications of radars, weather radar design and signal processing, phased array weather radar. Microwave and Millimeter wave integrated circuits including Antennas, Radio Frequency MEMS.
- **Nanoelectronics, Plasmonics & Semiconductor Devices**: Research broadly in semiconductor devices and modeling, nanoelectronics, plasmonics/optoelectronics, development of instruments for experiments in nanoelectronics.
- **Power Electronics**: Voltage Source Inverters (VSI), modulation and control of voltage source inverters, control of power electronic systems, HVDC and FACTS, Modular Multilevel Converters, Renewable Energy, Induction Motor Drives.
- **Power Systems**: Power system modelling, wide area monitoring, protection and control (WAMPAC), Renewable and Distributed generation, Big data analytics, machine learning and signal processing for smart grid.

Research Areas Available for Admission in July 2022

- Control and Robotics
- Antennas & Applied Electromagnetics, RF and Microwave Integrated Circuits
- Digital VLSI design
- Sensors, Measurements, and Instrumentation:
- Signal Processing and Image Processing
- Power electronics and Power Systems
- Nanoelectronics, Plasmonics And Semiconductor Devices
  Details regarding July 2022 vacancies in the department of EE can be found here:
  EE - Research Areas in which vacancies exist for July 2022 MS/PhD admissions

Exceptional Ph.D. applicants meeting the appropriate criteria can be supported by Ph.D. fellowship from the following sponsored research projects funded by various agencies.

1. **Design and Fabrication of an LED-based solar simulator with integrated electrical and optical measurement capability**

Principal Investigator : Dr. Arvind Ajoy

Co PIs : Dr. Arun Rahul S and Dr. Revathy P

Project No : DST/TMD/CERI/RES/2020/21 (G)

Funding Agency : DST-SERD

2. **Development of an Affordable Wearable IoT-GPS Enabled Intelligent Vital Signs Monitor for Smart Health Monitoring Services**

Principal Investigator : Dr. Sabarimalai Manikandan

Aim and Major Objectives: The aim of this project proposal is to design and develop an affordable wearable intelligent IoT-enabled vital signs monitoring system for health and wellness monitoring and management of individual and community health services. The proposed intelligent wearable IoT-GPS enabled vital signs monitor consists of a multichannel data acquisition unit for acquiring ECG, and PPG signals, signal quality assessment and physiological parameter measurement units, physical activity recognition unit, early warning unit, wireless communication unit, audio and visual communication unit and medical history management unit.

Project No : GIA/2019/000596/PRCGIA

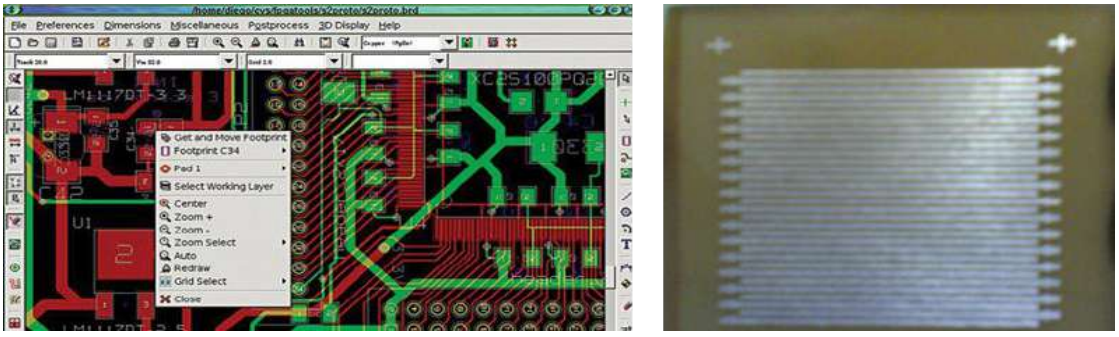
Funding Agency: ICMR

Facilities

- **Electronics Technology Laboratory**: Electronics Technology Laboratory provides an integrated environment for students to understand the working of analog and digital circuits, microprocessors, microcontrollers, and the interplay between computational tools and electronics hardware. Each desk is equipped with digital storage oscilloscopes, arbitrary waveform generators, power supplies and various prototyping boards (Field Programmable Gate Arrays, Microcontrollers, etc.) and a desktop PC. In addition, it houses the set-ups for control systems experiments such as ball and beam, rotary inverted pendulum, magnetic levitation and closed loop temperature controller. Digital Circuits, Analog Electronics, Computer Aided Design and Control Systems lab courses are also run in this laboratory.
- **Communications and Microwave Laboratory**: Communications and Microwave Laboratory provide an environment for understanding and experiencing the signal chain of a typical analog and digital communication system and microwave systems. Typical facilities include optical fiber training kits that have a multi-channel multiplexing encoder and a corresponding decoder with demultiplexer, where one can perform various wired optical communication experiments. The laboratory also houses software defined radios - national instruments 2901 and 2920 which are very versatile and reconfigurable radios that can operate in the range 70MHz to 6GHz and can be used

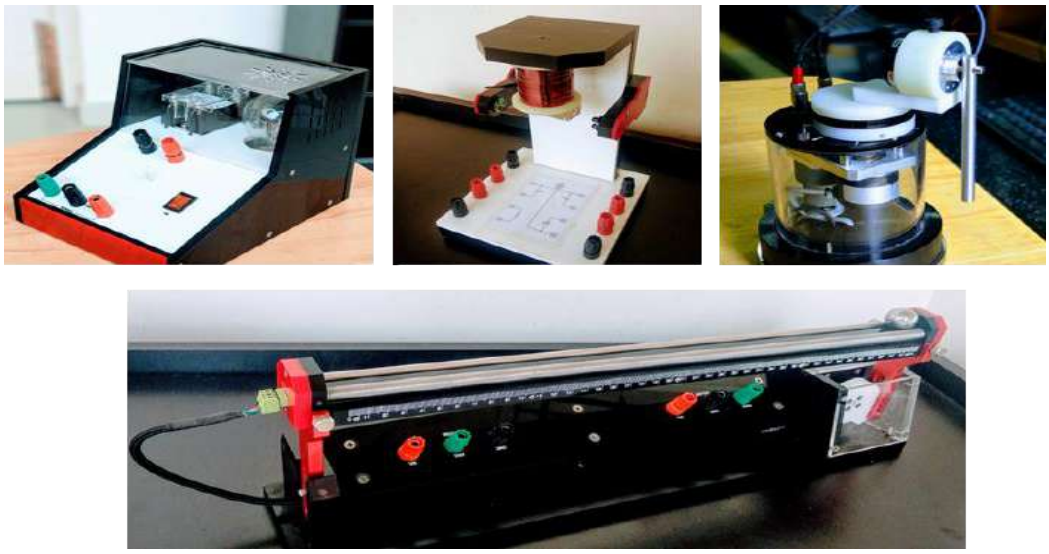
to prototype various communication systems and new technologies for applications such as 5G and IoT.

- **Electrical Machines Laboratory**: Electrical Machines Laboratory provides students with an opportunity to understand the working of various AC and DC machinery. Some of the facilities include: 14 machine beds each consisting of 2 DC machines coupled with induction machine and synchronous machine, fully isolated voltage and current measurement units, data acquisition systems for capturing real time data, a unique make your own electrical machines by integrating various parts and its testing facility, bidirectional power DC power supply, special machines like BLDC, SRM, single phase and 5 phase machines, single phase and three phase and multi winding transformers.

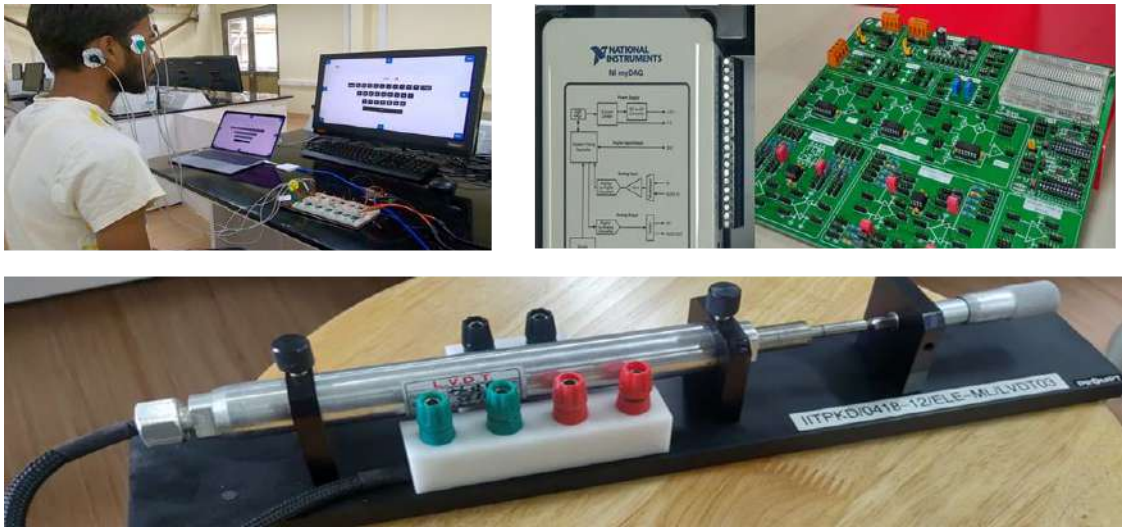


Computer Aided Design, Left: KiCAD for Layout, Right: Toner Transfer for PCB

- **Power Systems Laboratory**: Power Systems Laboratory provides students with an environment to experiment on various aspects of power systems including safety and quality. Some of the facilities include: Fault simulator for studying and analyzing various power systems faults, facility for studying parallel operation of alternators, facility for studying earth fault protection, differential protection, over voltage and over current protection, solar simulator for studying PV array characteristics, air blast circuit breaker assembly with earth fault protection, earth resistance measurement unit, power quality analyzer, insulation testers and PSCAD/DSA Tools/Mipower for power system analysis.



Control Systems Lab, In Clockwise Order from Top: Temperature Control, Magnetic Levitation, Inverted Pendulum and Ball and Beam Balancing

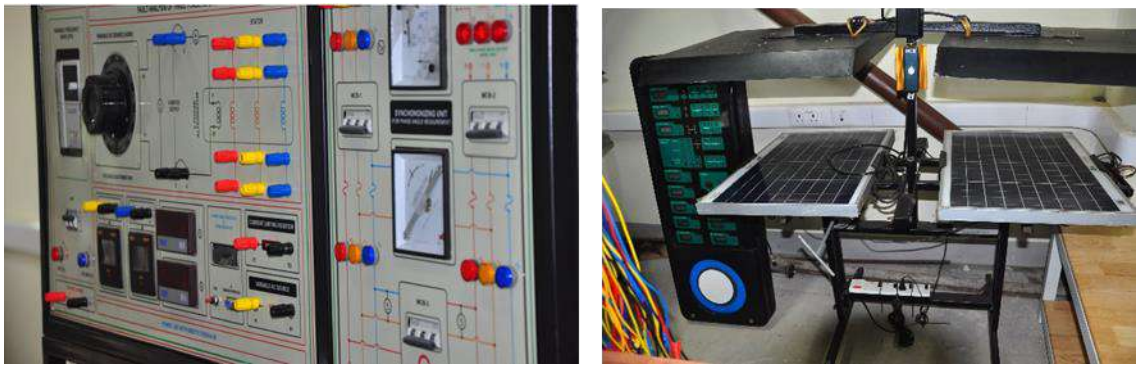


Measurements and Instrumentation Lab, In Clockwise Order from Top: Electro-oculogram EOG Data Acquisition, Analog Signal Conditioning (TI ASLK) and Data Acquisition (NI MyDAQ) and Linear Variable Differential Transformer (LVDT) setup

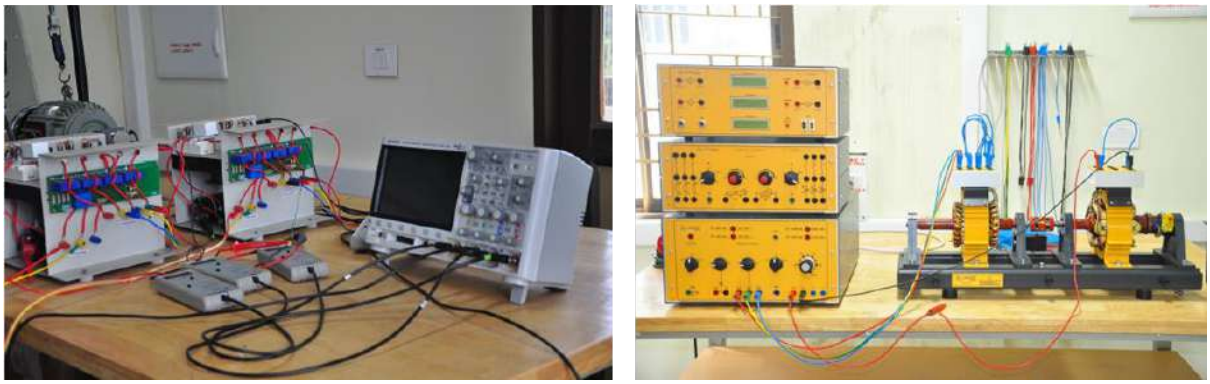
- **Power Electronics Laboratory**: Power Electronics Laboratory provides students with an exposure to latest trends in power electronics research and development. Facilities include: IGBT modules with isolated gate drive assembly45 kw Bidirectional DC power supply, TMS320f28379D controller boards, Spartan 6 FPGA cards, High end Oscilloscopes with differential probes for high voltage and high current measurement, Hall effect voltage and current sensors, Iron core and ferrite core inductors

Communications and Microwave Lab, Left: Software Defined Radio (SDR) Kit, Right: Microwave Communication Set Up

Electrical Machines Lab, Left: Electrical Machines, Right: Advanced Human Machine Interface



Power Systems Lab, Left: Alternator Fault Simulator wWith Grid Synchronization Facility, Right: Solar Photo Voltaic Array Simulator



Power Electronics Lab, Left: IGBT based Inverter Modules, DSO and Differential Probes, Right: Facility to Assembling and Test Various Machines

4.7. Humanities and Social Sciences

The Faculty

1. Dr. Amrita Roy, PhD (Jawaharlal Nehru University)
2. Dr. Anoop George, PhD (IIT Bombay)
3. Dr. Reenu Punnoose, PhD (Newcastle University, U.K)
4. Dr. Sujatha G, PhD (University of Madras)
5. Dr. Senthilkumar V, PhD (IIT Madras)

The Humanities and Social Sciences (HSS) at IIT Palakkad comprises a team of five faculty members, one post-doctoral fellow and seven PhD scholars who work on diverse research areas in Philosophy, Economics, Gender and Culture Studies and Linguistics. We offer a range of elective courses for undergraduate and postgraduate engineering and science students as well as core PhD- level courses for our doctoral scholars which encourage critical thinking, create awareness of real world issues and enable a comprehensive understanding of topics from multiple perspectives. The courses on offer also include those that aim to hone the soft skills of students and initiate pertinent conversations on ethical practices in research, in the workplace and life in general. In the long run, we hope to launch postgraduate programs within subject areas in the Humanities and Social Sciences and continue to engage in research at the intersection of subject areas within the HSS and between the HSS, science and technology.

Research Areas

- Economics: Development Economics
- Philosophy: Continental Philosophy, Phenomenology and Existentialism
- Linguistics: Experimental Phonetics, Sociolinguistics, Phonological language acquisition
- English: Culture Studies
- Engineering Economics

4.8. Mathematics

The Faculty

1. Prof. S H Kulkarni, PhD (IIT Bombay)
2. Dr. Arpan Kabiraj, PhD (IISc Bangalore)
3. Dr. Ashok Kumar M, PhD (IISc Bangalore)
4. Dr. G P Balakumar, PhD (IISc Bangalore)
5. Dr. Hari Vansh Rai Mittal (IIT Mandi)
6. Dr. Jaikrishnan Janardhanan , PhD (IISc Bangalore)
7. Dr. Jayanarayanan C R, PhD (ISI Bangalore)
8. Dr. Lakshmi Sankar K, PhD (Mississippi State University, USA)
9. Dr.. Parangama Sarkar, PhD (IIT Bombay)
10. Dr. Rohith Varma PhD, (Chennai Mathematical Institute, Chennai)
11. Dr. Sarath Sasi, PhD (Mississippi State University, USA)
12. Prof. Varadharajan Muruganandam (IIT Kanpur)

The Discipline of Mathematics at IIT Palakkad is strongly committed to excellence in research and teaching. We envisage a period of fast growth leading to a strong and diverse Mathematics community at IIT Palakkad. A PhD program in the discipline of Mathematics was started in 2017. There are nine PhD level research scholars working in the Discipline of Mathematics now.

Research Areas

- Functional Analysis Geometry of Banach spaces
- Approximation Theory
- Banach algebras and Operator theory
- Partial Differential Equations
- Nonlinear Analysis
- Probability and Statistics
- Statistical Inference
- Several Complex Variables
- Information Theory
- Algebraic Geometry
- Commutative Algebra
- Low-Dimensional Topology
- Information Geometry
- Computational Fluid Dynamics

Research Areas Available for Admission in July 2022

- Computational Fluid Dynamics, Numerical Analysis
- Partial Differential Equations, Nonlinear Analysis
- Several complex variables

- Information Theory and Statistics
- Functional Analysis
- Graph Theory and Combinatorics

4.9. Mechanical Engineering

The Faculty

1. Dr. Afzaal Ahmed, PhD (NUS Singapore)
2. Dr. Anand T. N. C., PhD (IISc Bangalore)
3. Dr. Anoop Akkoorath Mana, PhD (IISc Bangalore)
4. Dr. Buchibabu Vicharapu, PhD (IIT Bombay)
5. Dr. D. Chakradhar, PhD (NIT Warangal)
6. Dr. Dinesh Setti, PhD (IIT Delhi)
7. Dr. Ganesh Natarajan, PhD (IISc Bangalore)
8. Dr. Kanmani Subbu S., PhD (IIT Kanpur)
9. Dr. Kesavan D., PhD (IIT Madras)
10. Dr. Krishna Sesha Giri, PhD (IISc Bangalore)
11. Dr. K. V. N. Surendra, PhD (IISc Bangalore)
12. Dr. Pramod Kuntikana, PhD (IIT Bombay)
13. Dr. Samarjeet Chanda, PhD (IIT Madras)
14. Dr. Santhakumar Mohan, PhD (IIT Madras)
15. Dr. Sovan Lal Das, PhD (Cornell University, USA)

The department of Mechanical Engineering offers a 4-year undergraduate B.Tech. Program, 2-year Masters' program, and research (MS and PhD) programs. The undergraduate curriculum of the stream mainly integrates fundamentals of mechanical sciences & engineering along with electives concerning allied and general topics including professional ethics. M. Tech. at PG level is offered in Manufacturing and Materials Engineering emphasis on developing depth in both fundamental and applied aspects with inquisitiveness. The Mechanical Engineering department has three broad sub-disciplines – thermo-fluids, design and manufacturing. Research in the thermo-fluids stream includes experimental and numerical heat transfer and combustion, laser diagnostics, thermal management for batteries and computational fluid dynamics. Faculty in the field of solid mechanics and design carry out research related to fracture mechanics, vibrations, robotics, granular mechanics and biophysics. Among the research areas in the manufacturing sub-stream are additive manufacturing, friction-stir welding and solid-state welding, tribology, super finishing and minimum quantity lubrication. Some of the current research projects include studies on soot modelling, studies of battery thermal management systems, modelling of adhesion in thin and soft structures, bio-inspired underwater vehicles, evaluation of cryogenic cooling for machining, rolling contact fatigue studies on bearing steels and micro electric discharge milling of metal matrix composites.

Research Areas

- **Thermo-Fluids**: Combustion/Propulsion Research, Engine Modelling/Control, Combustion and Laser Diagnostics, Combustion Modeling, Novel Laser and Optical Diagnostic Techniques, Computational Fluid Dynamics - Immersed Boundary Methods, Turbulence, Sports Aerodynamics and Mathematical Modelling, Experimental and Numerical Heat Transfer and Energy Systems, Heat and Mass Transfer, Inverse Problems in Thermal-Fluid Sciences, Interferometry, and Optimization, Renewable Energy, Experimental Fluid Mechanics and Heat Transfer, Thermal Management, Flow Metering.
- **Solid Mechanics and Design**: Continuum Mechanics, Fracture Mechanics, Theoretical and Applied Mechanics, Contact Mechanics of Thin Structures, Lipid Bilayer Membrane, Robotics Motion Control, Mechanism Design and Analysis, Service and Field Robots, Mobile Robots and Manipulators, Rehabilitation and Assistive Robots, Underwater Vehicles and Manipulator Systems, Vibro-acoustics, Underwater acoustics, Acoustic metamaterials.
- **Materials Science and Manufacturing Engineering**: Ultra-precision Machining, Diamond Turning, Hybrid Machining, Deep-Hole Drilling, Non-Conventional Machining, Conventional Machining, Advanced Materials, Micro Manufacturing, Laser Surface Treatment, Additive Manufacturing and Composite Fabrication and Machining, Surface Engineering, Welding Technology, Process modeling of welding and metal additive manufacturing processes, Industrial Tribology, Grinding, Abrasive finishing Processes.

Research Areas Available for Admission in July 2022

- Elasticity and Fracture Mechanics
- Advanced Finishing Processes
- Vibration and acoustics
- Robotics and Control
- Ultra-Precision Machining, Additive Manufacturing, Non-conventional Machining
- Experimental Fluid Flow and Heat Transfer

Facilities

Thermal and Fluids Engineering is a conventional specialisation of Mechanical Engineering that deals with the study of mass and energy interactions of various engineering systems such as heat exchangers, compressors, fans, IC engines, gas turbines, steam turbines, hydro turbines, pumps, heat pumps, refrigerators, air conditioners etc. The lab courses on Fluid Mechanics and Fluid Machines, Fuels and Combustion, Heat Transfer, Refrigeration and Air-conditioning are devised to give hands-on experience on various practical engineering applications to the undergraduate students.

Thermo fluids laboratory

Computerised internal combustion engine test rig

Solid Mechanics and Machine Design: Design Engineering is a conventional specialisation of Mechanical Engineering that deals with testing and designing various engineering components and systems. Through the conduct of designing, testing, modeling and characterization of engineering materials, students utilize their concepts on testing of materials, theory of machines, properties of materials and machine design to perform various experiments on the available equipment.

Design and manufacturing laboratory

Mechanism maker kit

Gear assembly setup

Manufacturing and Materials Engineering Laboratory: Manufacturing research laboratory has an advanced materials processing facility consisting of state-of-art metal additive manufacturing (AM) system, the method that relies on a digital data file being transmitted to a machine then builds the component. Few other facilities available in this laboratory are Wire electric discharge machine, coordinate measuring machine, Stir casting setup, Compression molding machine, Polymer 3D printer, Laser marker machine, Modular Production System and Virtual Reality system. Materials testing laboratory is equipped with mechanical and materials characterization facilities to measure hardness, tensile strength, fatigue strength and bending strength of any engineering materials. Along with that, a twin disc rolling contact fatigue (RCF) tester and axial fatigue testing machine with the capacity of 100 kN servo-hydraulic frame are also available.

Coordinate measuring machine

Rolling mill

Modular production system

a) Abrasive cutting machine, b) Mounting press, c) Belt grinder, d) Polishing machine, e) Fume hood, f) Metallurgical microscope, g) Vickers hardness tester.

4.10. Physics

The Faculty

1. Prof. P B Sunil Kumar, PhD (RRI, Bangalore)
2. Dr. Amit Kumar Pal, PhD (Bose Institute Kolkata)
3. Dr. Bibhu Ranjan Sarangi, PhD (RRI Bangalore)
4. Dr. Debarati Chatterjee (IISc Bangalore)
5. Dr. Jayakumar Balakrishnan, PhD (National University of Singapore)
6. Dr. Kusum Dhochak, PhD (TIFR, Mumbai)
7. Dr. Prithvi Narayan P, PhD (TIFR, Mumbai)
8. Dr. Projjwal Banerjee, PhD (University of Minnesota, Minneapolis, USA)
9. Dr. Soham Manni, PhD (Georg-August-Universitaet Goettingen, Germany)
10. Dr. Uma Divakaran, PhD (IIT Kanpur)
11. Dr. Vishwas V, PhD (JNCASR Bangalore)
12. Dr. Moumita Nandi, PhD (SINP Kolkata), Inspire Faculty
13. Dr. Swaroop Sahoo, PhD (Colorado State University, USA)

The Department of Physics, IIT Palakkad started functioning from August 2015, and has now grown into a vibrant part of the Institute with its creative and passionate teaching endeavours at the undergraduate and postgraduate level along with cutting-edge research components in the forefront of experimental and theoretical physics. There are currently 11 Faculty members, 1 Inspire Faculty, and 1 Post-Doctoral Researcher in the Discipline, engaged in various research projects in several topical and multidisciplinary areas. In July 2017, the discipline started its dedicated PhD program, and at present a total of 16 students are pursuing research. Besides its thriving research activities, the discipline also runs a two year M.Sc program in Physics, and supports in training young Engineering undergraduate students in basic sciences.

Research Areas

- Astrophysics
- Experimental Biophysics
- Experimental Condensed Matter Physics
- High Energy Physics and String Theory
- Statistical Physics
- Soft-Matter Physics
- Many-Body Physics
- Quantum Information Theory and Quantum Computation
- Non-Equilibrium Dynamics and Quantum Phase Transitions

Research Areas Available for Admissions in July 2022

- Soft Matter Physics
- Experimental Condensed Matter

Facilities

The discipline has at present a teaching Physics laboratory to cater the needs of UG and PG students and is equipped with state of the art experimental setups. The M.Sc. Physics laboratories are categorized by different themes, namely, Mechanics, Electromagnetism, Thermal Physics, Atomic Physics and Spectroscopy, and Electronics and Instrumentation. The M.Sc advanced Physics Laboratory has LN2 Cryostat, Scanning tunneling microscope and Fluorescence Microscope which are used for teaching and research purposes. Different research equipment are installed under central facilities and individual labs.

Experimental Material Research Facilities

- Single crystal growth Facilities (High Temperature Programmable Chamber, tube and Gradient Furnaces, Quartz Tube sealing station[in process], Centrifuge etc.)
- Thin Film Growth Facilities (Sputtering, Lithography, Glovebox inside class 100000 and class 10000 cleanrooms)
- Closed-Cycle Cryostat (Tmin = 300 mK, Bmax = 12 Tesla): Oxford VTI
- Rigaku X-ray Diffractometer
- SEM-EDS
- Raman Spectrometer (90 K - 600 K)

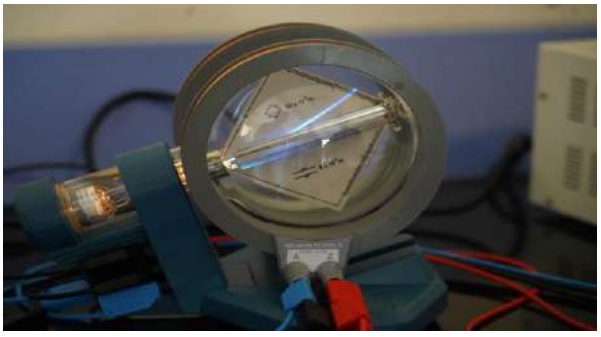
More details can be found here: https://cif.iitpkd.ac.in/

Computational Facilities

- Chandra-High Performance Computing Cluster (HPC) [64 compute nodes, each with a dual 12-core Intel processor. Each core runs at 2.2 GHz and has 4 GB of RAM per core. 100TB Disk space. The HPC is one of the first systems in India to use a 100 Gbps high-speed OmniPath interconnect from Intel.

Experimental Biophysics

- Epi-fluorescence microscope (Fully motorized microscope with Zero drift compensation stage, Phase contrast imaging)
- Confocal Imaging Facility (CIF).(with Hybrid Scanner, four Laser lines in the visible region, High sensitive Detectors, live cell imaging facility)



4.11. Environmental Sciences & Sustainable Engineering Centre (ESSENCE)

The Faculty

1. Dr. Arun Rahul S, PhD (IISc Bangalore)
2. Dr. Athira P, PhD (IIT Madras)
3. Dr. C V Veena Venudharan, PhD (IIT Kharagpur)
4. Dr. Deepak Jaiswal, PhD (Pennsylvania State University, USA)
5. Dr. Dinesh Jagadeesan, PhD (JNCASR, Bangalore)
6. Dr. Divya P V, PhD (IIT Bombay)
7. Dr. Mintu Porel, PhD (University of Miami, USA)
8. Dr. Praveena Gangadharan, PhD (IIT Madras)
9. Dr. Sunitha K Nayar, PhD (IIT Madras)

Research Areas

ESSENCE is an interdisciplinary research centre and works in collaboration with other departments and centres at IIT Palakkad. At present, ESSENCE's thrust areas are sustainability assessment, agriculture, bioenergy, and water/wastewater management.

Research Areas Available for Admission in July 2022

- Water and wastewater treatment, Advanced oxidation process, Capacitive desalination cells, Bioelectrochemical systems
- Water and wastewater treatment, Advanced oxidation process, Capacitive desalination cells, Bioelectrochemical systems
- Sustainability merit of AR-Gap pavements
- Landslide modelling and prediction

Facilities

All the central research facilities (high performance computing cluster, central instrumentation facility, etc.) available at IIT Palakkad are used on the need basis.

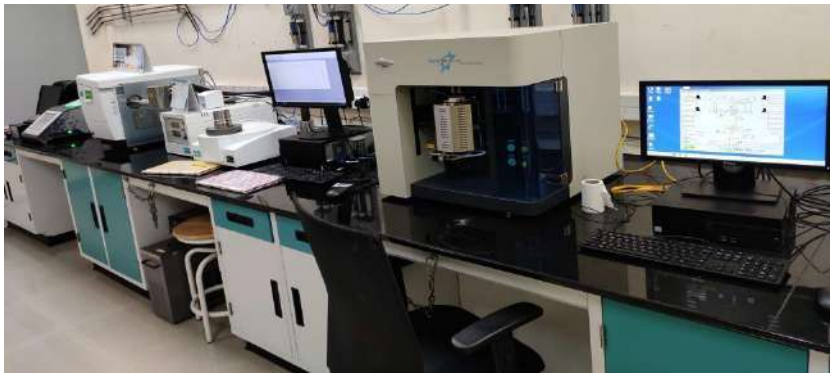
5. Central Research Facilities

5.1. Central Instrumentation Facility (CIF)

In 2019-2020, IIT Palakkad established the Central Instrumentation Facility (CIF) and the Central Micro-Nano Fabrication Facility (CMFF) to support high- quality research in design and development of functional molecules, materials and devices. These facilities maintain a high operational standard of sophisticated equipment. Functionally, the facilities in CIF & CMFF are

grouped under the themes of Synthesis, Characterization and Fabrication. CIF houses sophisticated equipment for synthesis and characterization, while CMFF maintains a clean room and other facilities needed for the fabrication of devices at the micro and nanoscale.

The CIF houses a range of sophisticated analytical equipment capable of studying the physical, chemical, electrical, mechanical and magnetic properties of molecules as well as materials. The equipment are installed and operated across the Ahalia and Nila campus presently but will eventually be relocated to a dedicated Research Complex at the permanent campus of the Institute. Some of the characterization equipment in CIF are: Semiconductor Parameter Analyser, Vector Network Analyzer, Signal Analyzer, Analog, Microwave Signal Generator, Wire Bonder, Mixed signal digital storage oscilloscope, 64- channel Electroencephalograph (EEG) Data Acquisition System, High Performance Liquid Chromatography, Liquid Chromatography Mass Spectroscopy, Nuclear Magnetic Resonance Spectrometer, Raman spectrophotometer, X-ray diffractometer, Scanning Electron Microscope, Confocal Microscopy, PCB prototyping machine, Infrared spectrophotometer. CIF has also set up a high end unit for Materials Synthesis and Processing (MSP under CIF) where a range of sophisticated high temperature furnaces, arc melting furnace, ball mill, quartz tube sealing station are housed and maintained.



Sophisticated equipment of CIF in Ahalia Campus.

5.2. Central Micro-Nano Fabrication Facility (CMFF)

The Central Micro-Nano Fabrication Facility (CMFF) has class 100000 and class 10000 cleanrooms, well-equipped for fabrication of devices. The cleanroom houses two class 100 polypropylene fume hoods, a deionized water plant, an RF sputtering system, and a mask aligner. The RF sputtering system can deposit thin layers of metals and non-metals onto a substrate. The mask aligner can demarcate micrometer-scale patterns onto the substrate using photolithography. This system is capable of performing multilevel photolithography on top and bottom side of substrates, with minimum features in the sub-micron range. Realization of microstructures is possible using wet-chemical methods performed inside the fume hoods. The deionized water plant provides the high-resistivity water needed during the processing. Recently, we have also added an optical microscope, a three-port glove box, and a critical point dryer (CPD) to this facility.

Broadly, research is proposed in the areas including (but not limited to): (i) Design, fabrication and characterization of 2D spin devices (including GMR devices), heterostructures of 2D materials and perovskites; (ii) Design, fabrication and characterization of CMOS-compatible photodetectors; (iii) Fabrication and characterization of RRAMS, non-linear selector devices for RRAMS, and one-time programmable memories; (iv) 2D material-based MEMS sensors, and new strategies for design of MEMS-based structures that incorporate negative capacitance; (v) Design and characterization of GaN-based mmwave devices and circuits; (vi) Fabrication and characterization of Perovskite solar cells.

Central Micro-Nano Fabrication Facility

5.3. Central Facility for Materials and Manufacturing Engineering (CFMM)

CFMM houses advanced materials processing, testing and manufacturing processing facilities to support basic and applied research activities in various streams of engineering. It is an essential platform not only to compete intellectually with the rest of the world but also enables us to make ingenuine contributions relevant to our country in the growing field of materials processing, manufacturing of engineering components and products. This supports the research on materials processing that includes development of alloys and composites, manufacturing of components includes turbine & compressor parts, aerofoils, medical implants, actuators, medical scaffolds, machine tools, energy components, etc., and manufacturing of products includes robots, devices, unconventional machines, energy efficient vehicles, etc.

3D Metal additive manufacturing facility

5.4. High Performance Computing Cluster

The Chandra High performance computing cluster (HPC) provides a powerful computing platform for research in engineering and physical sciences. This system has been operational since June 2017. The HPC consists of 64 compute nodes, each with a dual 12-core Intel processor. Each core runs at 2.2 GHz and has 4 GB of RAM per core. The HPC is one of the first systems in India to use a 100 Gbps high-speed Omni Path interconnect from Intel. The system provides about 50 TFlops of computing power. Chandra also accesses 100 TB of disk space setup as a parallel file system running Lustre from Intel.

The HPC is used by faculty, research staff and students at IIT Palakkad to investigate complex research problems in science and engineering. Some of the problems currently being studied are:

- Understanding and designing materials with novel physical properties by performing atomistic quantum mechanical simulations.
- Design of nanoscale transistors for next generation electronic applications.
- Design of novel bio-molecules with applications in medicine.
- Design of large structures such as bridges and buildings.
- Performing computational fluid dynamic simulations.
- Understanding the process of heat transfer in complex systems such as engines.
- Solving non-equilibrium dynamics in quantum Hamiltonians.

6. MS and PhD admissions

6.1. Application

A candidate can apply to more than one department. The maximum number of departments to which he/she can apply will be two.

6.2. Financial Assistance

Assistance will be as per MHRD norms. Fulltime Scholars admitted to MS and PhD program are eligible for the Half-time Teaching/Research Assistantship (HTRA) for which:

1. They should work for 8 hours per week for the Institute to earn this assistantship. The work would normally involve assistance in teaching/research, and will be assigned by the Institute.
2. Renewal of assistantship every semester will be contingent on enrolment, satisfactory progress in research work and good performance during the preceding semester in the discharge of responsibility as teaching/ research assistant.

Other scholarships like UGC- JRF, CSIR-JRF, ICMR, ICAR & AICTE etc. may also be available for those who have qualified for these schemes and get admission and the amount of fellowship will be as per the norms of the funding agency.

6.3. Minimum Eligibility

6.3.1. MS

The minimum educational qualifications for admission to the MS by research degree are as follows:

1. Candidates with a four year Bachelor's degree in Engineering/Technology/Sciences or a Master's degree in sciences with a valid GATE score in relevant discipline.
2. Candidates with a good academic record, having memberships in professional bodies, approved by the MoE/UGC/AICTE, are also eligible for admission to the MS programme of their parent discipline provided they have a valid GATE score and have passed both part A and part B of the membership examinations.
3. Candidates who have qualified for the award of four year Bachelor's degree in Engineering/Technology/Sciences from a Centrally Funded Technical Institute (CFTI) with an exceptionally good academic record in an eligible discipline provided he/she has a minimum CGPA of 8.0 (7.5 for OBC- NCL and 7.0 for SC/ST/PwD) on a 10.0 point scale.

6.3.2. PhD

The minimum educational qualifications for admission to the PhD program of the Institute are as follows:

PhD in Engineering

1. Candidates with a Master's degree in Engineering/Technology or a Master's degree by Research in Engineering/Technology with a good academic record.
2. Candidates with Master's degree in Sciences with a good academic record and of exceptional merit are eligible for the relevant Engineering discipline. They should have a valid GATE score or UGC / CSIR-LS & JRF/ NBHM or equivalent qualification in the relevant area tenable for the year of registration.
3. Candidates who have qualified for the award of four year Bachelor's degree in Engineering/Technology/Sciences with an exceptionally good academic record and valid GATE score in an eligible discipline will be considered for direct admission to PhD
4. Candidates who have qualified for the award of four year Bachelor's or integrated Master's degree in Engineering/Technology/Sciences from a Centrally Funded Technical Institute (CFTI) with an exceptionally good academic record in an eligible discipline provided he/she has a minimum CGPA of 8 (7.5 for OBC- NCL and 7.0 for SC/ST/PwD) on a 10.0 point scale.

PhD in Sciences

1. Master's degree in Engineering/Technology/Sciences/Medical /Pharma/Veterinary Sciences/Allied Health Sciences with good academic record and valid GATE score or UGC/CSIR-LS&JRF /NBHM/INSPIRE/ICMR/JEST or other similar National Level

Fellowships or equivalent qualification tenable for the current financial year in the relevant area.

2. Candidates who have qualified for the award of four year Bachelor's degree in Engineering/Technology/Sciences with an exceptionally good academic record and valid GATE score in an eligible discipline will be considered for direct admission to PhD
3. Candidates who have qualified for the award of four year Bachelor's or integrated Master's degree in Engineering/Technology/Sciences from a Centrally Funded Technical Institute (CFTI) with an exceptionally good academic record in an eligible discipline provided he/she has a minimum CGPA of 8 (7.5 for OBC- NCL and 7.0 for SC/ST/PwD) on a 10.0 point scale.

PhD in Humanities and Social Sciences

1. Master's degree in Humanities with good academic record and valid GATE score or UGC-NET/JRF or other similar National Level Fellowships or equivalent qualification tenable for the current financial year in the relevant area.
2. Master's degree in Engineering/Technology/Sciences with exceptionally good academic record with a valid GATE score.
3. Candidates who have qualified for the award of four year Bachelor' degree in Engineering/Technology/Sciences with an exceptionally good academic record and a valid GATE score will be considered for direct admission to PhD
4. Candidates who have qualified for the award of four year Bachelor's or integrated Master's degree in Engineering/Technology/Sciences from a Centrally Funded Technical Institute (CFTI) with an exceptionally good academic record in an eligible discipline provided he/she has a minimum CGPA of 8 (7.5 for OBC- NCL and 7.0 for SC/ST/PwD) on a 10.0 point scale.

6.3.3. Institute staff members or Research Scholars under External Registration

For MS/PhD Research Scholars in these categories, the minimum educational qualifications are the same as prescribed for full time research scholars. However, valid GATE score or CSIR / UGC JRF or Lectureship / NBHM or equivalent qualification as applicable for regular full time research scholars shall not be required in these cases.

6.4. Selection Procedure

Eligible candidates possessing the minimum educational qualifications (as given in section 6.3) and satisfying additional and stiffer criteria set from time to time, will be called for an interview and/or test by the Selection Committee.

All applicants are required to upload a statement of purpose (SOP) in support of their application in pdf format in research admission portal.

1. SOP should list research areas in the order of preference.
2. SOP should not exceed 500 words.
3. SOP should be submitted in pdf format.

The applications of foreign nationals may be considered with or without a personal interview / test.

Based on the academic record and the performance of the candidates in the interview and/or test, the Selection Committee will recommend to the Chairman, Senate the names of candidates found suitable for admission.

Please note that SC/ST candidates can apply to all available research areas of a Department.

6.5. Interview

Depending upon the Covid situation during the interview time, the Departments may decide to conduct online or offline interviews

6.6. Reservation of Seats

Reservations are applicable to SC/ST/OBC-NCL/EWS/PwD candidates as per Govt. of India rules.

6.7. Verification of certificates

Candidates joining MS/PhD program in July-December/December-June session have to submit their original mark/grade sheets along with provisional certificates at the time of admission. They should also produce their required degree certificate for having passed the qualifying examination on or before 31st October for July admission / 31st March for December admission.

The candidate should submit the following original documents for verification at the time of interview/admission:

1. Printed copy of application submitted.
2. Offer of admission.
3. Aadhar No. & PAN No.
4. First page of SSLC/SSC/Matriculation certificate
5. Degree certificate/Provisional/Course completion certificate / Grade Cards/Mark sheets of all semesters beginning from first degree towards proof of qualification.
6. Original GATE Score Card/UGC-JRF/NET/CSIR-JRF/DAE-JEST or other fellowship award letter.
7. Copy of GATE score or UGC - JRF/NET/CSIR/ DAE-JEST or other fellowship award.
8. Project coordinators certificate in the prescribed format and a copy of project appointment letter in the case of Project Associate if already appointed.

9. SC/ST/OBC-NCL community certificate for the candidate belonging to SC/ST/ OBC-NCL category issued by the respective State Government. OBC-NCL scholars have to bring a Non-creamy layer community certificate valid at the time of admission.
10. Certificate proving EWS category.
11. Authorized Doctors Certificate with disability descriptions in the case of Person with Disabled (PwD) candidates.
12. Relieving order/Resignation acceptance letter from the employer in the case of full time candidates, if employed except candidates selected under IITPKD Staff scheme.

In addition to the above documents, the External Registration candidates need to produce the following from their employer:

1. Research Coordinator/Co-guide's Consent letter
2. Copy of Research Coordinator's Degree certificate
3. NoC/Relief from the present employer

The above documents have to be submitted in the prescribed format as given in the Appendices at the end of the Brochure.

7. Fees, Deposits and Refund Policy

7.1 Fees and Deposits

S. No.	Particulars	MS	PhD
A. ONE TIME FEES			
1	Admission Fee	300	300
2	Grade Card / Thesis Fee	500	1000
3	Provisional Certificate	150	150
4	Alumni Life Membership Fee	1500	1500
5	Modernization Fee	300	300
6	Student Welfare Fund	700	700
7	Publication Fee	250	250
8	Institute Caution Deposit	1000	1000
9	Library Caution Deposit	1000	1000
	Sub-Total	**5700**	**6200**
B. INSTITUTE FEES			
1	Tuition fee #	2500	2500
2	Examination fee	500	500
3	Registration - Enrollment fee	300	300
4	Hostel Seat Rent *	6500	6500

5	Electricity, Water & SWD Charges *	900	900
	Sub-Total (for day scholars)	**3300**	**3300**
	Sub-Total (for hostellers)	**10700**	**10700**
C. ONE-TIME HOSTEL FEES			
1	Hostel Caution Deposit *	**3500**	**3500**
D. STUDENTS' SECTOR FEES & ADVANCE DINING CHARGES			
1	Medical insurance	400	400
2	Wellness fees	750	750
3	Gymkhana fee	1400	1400
4	Establishment A	5250	5250
5	Hostel Admission Fee *	200	200
6	Establishment B *	1500	1500
7	Advance Dining Charges *	27000	27000
	Sub-Total (for day-scholars)	**7800**	**7800**
	Sub-Total (for hostellers)	**36500**	**36500**

** For hostellers only*
 # Tuition fee is waived for SC/ST students

Hostel rooms are allotted depending on availability on a sharing basis. If you wish to be a day scholar, you should register your name in the Office of the Dean Students and obtain a day scholar certificate immediately after admission.

7.2 Refund Policy

If a candidate withdraws his/her admission before the official joining date, the amount paid by him/her will be refunded after deducting the administrative charge of Rs 2000/-. Once the student is admitted, then only the deposit part will be refunded.

8. Institute Library

As the informatics center of the Institute, the Central Library provides an enjoyable learning experience with a carefully developed collection of books, journals, standards, magazines and newspapers. The library also stores a collection of audio-visual materials such as CD-ROM, scientific kits etc. The library opened its doors to the students, faculty and staff in August 2015 with a collection of 700 printed books which has grown to more than 6000 printed barcodes and RFID tagged books (textbooks, reference, popular sciences and literature) in the past six years. Based on the needs and requirements of researchers, the library has subscribed to a number of electronic journals for its users. The library also has the support of national consortium E-Shodh Sindhu (INFLIBNET) to fulfill maximum journal requirements. The operations of the library are fully computerized and enabled with the RFID system for fast transactions, for ease of access as well as for the security of the library. The RFID based kiosk provides self-check-in and

self-check-out of books. Library is under a 24x7 CCTV surveillance system for security. The library is also enabled with Wi-Fi and LAN facility for unlimited high-speed internet access. Online facilities of the library are available 24x7x365 days for its registered users. Users can renew, reserve books through Online Public Access Catalog (OPAC) at any time. The library also renders services such as Reference and Consultation as well as updates the users with the Current Awareness Services. The users of the Central Library of IIT Palakkad are also registered with the National Digital Library sponsored by MHRD and coordinated by IIT Kharagpur.

9. Career Development Centre

The Career Development Center (CDC) of IIT Palakkad employs significant efforts to refine the capabilities, personality and work readiness of students with the help of placement, training and career preparation workshops. In order to facilitate better career opportunities, CDC constantly engages with industry through internships, industry visits, Industry-Academia conclave and also by hosting industry experts at the campus. A combination of rigorous yet sufficiently flexible curriculum prepares the students for the challenges in a competitive industrial environment. The centre is functional under a Faculty In-Charge and the Training and Placement officer (TPO) dedicated to the endeavor of grooming the students.

The major recruiters include Google, Sprinklr, Arista Networks, Cargill, TCS Research, L&T Groups, Target Corporation, MathWorks, Zoom, Texas Instruments, Honeywell, Silabs India,CTS, Signalchip Innovations, Jio Platform Limited, McKinsey, Marimba Auto, Maini Precision etc. A good number of core companies visited in this current season and recruited the students. Additionally, 5 pooled campus drives were hosted for the six new generation IITs and that resulted in a total of 15 offers. Moreover, the Virtual IAC 2.0 was hosted successfully and over 40 companies participated in the event. We are also delighted to note that 25 offers, with CTC INR 20 Lakhs and above have been made to the batch of 2020-21.

Key Placement Highlights

1. The highest Domestic CTC offered was INR 31.5 Lakhs per annum.
2. L&T Group has made the maximum number of offers this year (15 Offers).
3. Average CTC offered to the batch of 2021 was INR 11.42 Lakhs.
4. 50 percentage surges in the no. of companies participating for the year 2021.

Particulars	**2018-2019**	**2019-2020**	**2020-2021**
Batch Size	104	106	163
No. of Students Registered in the CDC Portal for Placement	77	82	115
No. of Offers	64	87	120
No. of Students Placed	57	74	97
No. of Companies Participated in the Campus Process	62	70	110

Placement Percentage (Based on No. of Students Placed)	74	90	84.34
No. of PPO's (Pre-Placement Offers)	5	15	6
Average CTC INR (In Lakhs)	8.44	9.93	11.42
Salary Range INR (In Lakhs)	6 to 16.75 per annum	5.4 to 21.3 per annum	3.3 to 31.59 per annum

Students Went for Higher Studies

Particulars	**2018-2019**	**2019-2020**	**2020-2021**
No. of Students Went For Higher Studies	18	16	20
University / Institute Details	Columbia University, Georgia Institute of Technology, University of California San Diego, The University of Texas At Dallas, University of Texas At Austin, University of Zurich, University of Southern California, National Taiwan University, And The IIMs & IITs.	Columbia University, North Western University, Pennsylvania State University, Arizona State University, UCLA, ESSEC Business School, Georgia Institute of Technology, And The IIMs & IITs	University of California Los Angeles (UCLA), University of Nottingham, Liverpool John Moores University, New York University, Otto Von Guericke University Magdeburg, Purdue University, Indian Institute of Science, IIM Calcutta, FMS Delhi, IIT Madras, IIT Bombay and IIT Guwahati

10. Hostel Facilities

IIT Palakkad has four hostels each in its Temporary (Ahalia) campus and three hostels in Nila campus in which the UG, PG and Research students are accommodated. Most of the rooms in the Ahalia campus hostels have attached washrooms. A common mess serves food to the students in the respective dining halls in the two campuses. The mess halls are provided with TV with DTH connection. All hostels are equipped with heavy duty washing machines and water dispensers with RO purifiers.

11. MITRA: Wellness Hub

Counselling services: A professional counselling service has been set up in order to ensure that the students receive help when they face social/emotional issues that require a professional approach. The services of two resident counsellors who are experienced clinical psychologists, one male and one female, are available to the students all the time. Apart from this, online counselling services are also made available to the students.

Life skill classes: Students are given a course in life skills to help them cope with stress, improve communication skills and manage conflicting objectives. This outbound training, conducted by experts, provides the students with a platform to discover new friends and develop new bonds. It enables them to come out of their shells and mingle with others. They are also taught the art of forming well-knit teams on whom they can lean when in need, without hesitation. This course is mainly aimed at developing interpersonal relationships, building confidence, and making the students comfortable while facing the public, interview boards and so on.

Health care: The students are covered by a comprehensive medical insurance scheme for a nominal yearly subscription. IIT Palakkad also has MOUs with Ahalia Diabetes Hospital, Athani Hospital, Avitis Clinic, Malabar Hospital, Manomitra and Thangam Hospital for cashless medical attention. Students can also go to the hospitals of the Ahalia Foundation for treatment as outpatients.

Sports facilities: IIT Palakkad is continuously improving its sports and games facilities. Good facilities exist for football, volleyball, basketball, table tennis, badminton, and cricket. Apart from hiring a resident sports coach in the campus, who trains students in different games, physical fitness, weight lifting, etc. and takes care of the Institute gym, the institute also hires other coaches as and when needed.

Anti-ragging measures: The motto of the Institute is zero tolerance to ragging. The students and parents are sensitized to this aspect through written documents and posters. A structured mechanism has been put in place to monitor ragging related issues and meet out the most stringent punishment to the wrong-doers, and enforce the anti-ragging regulations in letter and spirit.

APPENDICES

Appendix – 1

[To be submitted at the time of Admission]

Admission to PhD/MS programme under External Registration Scheme at IIT Palakkad

Proforma for Relieving Certificate

Shri/Smt/Kumari employed as…… …….. ……. is granted leave for 20 weeks (140 days) commencing from…… to …… and is relieved of his/her duties with effect from…… to ……..… to enable him/her to pursue MS/PhD Research programme under External Registration Scheme in August /January semester at the Indian Institute of Technology Palakkad, Kerala – 678557 as per their offer of admission letter No…….Dated ……..

Date :

Signature of the Officer with name and address of the Organization

Office Seal

Appendix – 2

[To be submitted at the time of Interview]

Certificate from the Employing Organization for external registration of their employees in PhD/MS programme of IIT Palakkad

The application of…..……working as…..... .....in…..... since …..…….. is herewith recommended and forwarded for admission under External Registration Scheme of the Indian Institute of Technology Palakkad for PhD/MS Research programme in the Department of ……

1. This organization has adequate facilities for carrying out the research indicated by the applicant and if he/she is selected, these will be made available to him/her till the completion of the programme.

2. The applicant will be deputed/given leave for the duration of his/her residence period at IIT Palakkad.

3. Facilities will be made available to the Co-guide to supervise the work of the applicant and to attend the meetings at IIT Palakkad when necessary.

4. Till the completion of his/her research programme, the applicant will not ordinarily be transferred to another unit or place which may impede his/her work under the scheme.

   If such a transfer is necessary, IIT Palakkad will be informed within a month of such transfer. We understand that continuing registration will depend on IIT‟s decision in this regard, taking into account all the relevant factors.

5. We note that the facilities of the Institute will be made available to him/her for carrying out the work and that there will be no separate charge (other than tuition fees payable by the candidate) for the use of laboratory, library and other facilities.

6. No part of the work carried out in fulfilment of the Research programme will be utilized commercially or for applying for a Patent without the approval of Indian Institute of Technology Palakkad and other than on terms mutually agreed to by IIT Palakkad and this organization.

Date:

Signature of the Officer :

Name and Designation:

Postal address of the Organization :

Seal of the organization/Institution

Appendix - 3

Particulars of Research Co-ordinator for students under External Registration Scheme

In addition to being in a position to ensure technical and logistic support to the scholar in his/her research work in the organization, the Research Co-ordinator must have a PhD degree and adequate professional experience in the relevant field. He/She will be an invitee to the Doctoral Committee/General Test Committee meetings at IIT Palakkad.

Details of the Research Co-ordinator

1. Name (in block letters) :

2. Designation :

3. Academic qualifications :

4. Membership of Professional Societies :

(Please attach a detailed CV, with qualifications, work experience, and list of publications of the Resesarch Co-ordinator) Certificate from the Research Co-ordinator

This is to state that in the event of Mr. /Ms._____ of this organization being selected for PhD / MS programme in the Department of under the External Registration Scheme of IIT Palakkad, I agree to be the Research Co-ordinator and I shall extend all possible facilities to enable him/her to carry out his/her research towards the completion of the programme.

Date: Signature of Research Co-ordinator

Appendix - 4

List of CFTI Institutions

1. INDIAN INSTITUTES OF TECHNOLOGY (All IITs)
2. INDIAN INSTITUTES OF MANAGEMENT (All IIMs)
3. INDIAN INSTITUTE OF SCIENCE (IISc), BANGALORE
4. INDIAN INSTITUTES OF SCIENCE EDUCATION AND RESEARCH (IISERs)
5. INDIAN INSTITUTES OF INFORMATION TECHNOLOGY (IIITs):
    a. Indian Institute of Information Technology Allahabad
    b. Atal Bihari Vajpayee - Indian Institute of Information Technology Gwalior-(ABVIIITM)
    c. Pandit Dwarka Prasad Mishra Indian Institute of Information Technology, Design and Manufacturing (IIITDM) Jabalpur
    d. Indian Institute of Information Technology, Design and Manufacturing (IITD&M) Kanchipuram.
6. NATIONAL INSTITUTES OF TECHNICAL TEACHERS '"TRAINING AND RESEARCH (NITTTRs)
7. NATIONAL INSTITUTES OF TECHNOLOGY (All NITs)
8. OTHER CENTRAL INSTITUTIONS
    a. Indian School of Mines University (ISMU), Dhanbad
    b. National Institute of Industrial Engg. (NITIE), Mumbai
    c. National Institute of Foundry & Forge Technology (NIFFT), Ranchi D. School of Planning & Architecture (SPA), New Delhi
    d. School of Planning & Architecture (SPA), Bhopal
    e. School of Planning & Architecture (SPA), Vijayawada
    f. Central Institute of Technology, Kokrajhar
    g. Sant Longowal Institute of Engineering & Technology (SLIET), Longowal, Punjab
    h. North Eastern Regional Institute of Science & Technology (NERIST), Itanagar