Indian Institute of Technology Palakkad

Nurturing Minds For a Better World

Under Ministry of Education, Government of India

IIT PALAKKAD

Post Graduate Admissions 2024-25

INFORMATION BROCHURE

CONTENTS

1. THE INSTITUTE

Main Entrance to the Nila campus

The Nila campus

Established in 2015, the Indian Institute of Technology, Palakkad is dedicated to creating an environment that enables students and faculty to engage in the pursuit of knowledge, to dream, think, and innovate thereby becoming change agents for a better world. Having begun with just 120 students in July 2015, IIT Palakkad has since grown

into an establishment that is about a thousand students strong and with the best manpower in key positions. IIT Palakkad aims to become a multi-disciplinary institution with 5000 students by its 10th year. The Institute recognises collective growth, in collaboration with industry and other academic institutions, as the need of the time and emphasises blue-sky research and directed research as two essential pillars of technology development. The Institute embraces a vision to be a leader in cross-disciplinary inquiries, and to contribute to the potential that India's demographic dividend represents for the country and the world, which is embodied in the motto of the institute “Nurturing minds for a better world”.

Aerial view of the Nila Campus

Located in the historic and vibrant region of Palakkad, known as the granary of Kerala, our institute is perfectly situated as the gateway to the state from the North, Palakkad Gap in the Western Ghats. Surrounded by rich traditions, significant historical events, and its sylvan surroundings, especially the Silent Valley rain forests and ubiquitous palmyra trees, Palakkad provides an inspiring backdrop for academic pursuits.

IIT Palakkad completed its transition to the permanent campus, Nila/ Sahyadri sector located at the scenic foothills of the Sahyadri mountain range in 2023. Operation on the Nila campus began in 2019. Nila consists of an academic space, named Samgatha, and a laboratory complex, known as Manogatha. Additionally, Nila houses essential facilities such as the Institute Clinic, Amenity Center, Csquare Innovation lab, and Air Quality weather station. Accommodations are conveniently available at Brindavani and Tilang hostels of Nila campus.

The Sahyadri campus sprawls across a 504-acre opposite to the Nila campus. Sahyadri consists of a series of facilities that facilitate academic, administration, and research activities.

Saraswati Block, Sahyadri Campus

The academic block named 'Saraswati' in the Sahyadri campus features a classroom Complex with a capacity of around 2000 students, a Central Fabrication Facility, a Heavy Machinery Lab, a Research Complex, and a large Infrastructure Testing lab. It is also equipped with advanced studio classrooms that facilitate multi-camera recording,

lightboard recording, chroma-keying, live-streaming, and web-based video conferencing and editing; and a digitalized Central Library with about 7000 printed in addition to a large number of digital resources, are already accessible to the teaching and student fraternity.

It also encompasses an administrative block, the APJ Abdul Kalam Block, the C06 Classroom cum Laboratory Complex, and the Sangraha block featuring four precast buildings. Additionally, the campus houses cutting-edge laboratories and centres like Smart AgriTech centre for Advanced Research and Development, GSCOE (Global Sanitation Centre of Excellence) lab, Environmental Engineering lab, and CIF (Central Instrumentation Facility) lab. Additionally, the campus is equipped with two hostels, namely Malhar and Saveri, as well as a dining hall called Kedaram.

Located just 14 kilometers from the Palakkad Railway Junction and approximately 60 kilometers from the Coimbatore International Airport, our institute offers excellent connectivity for students and visitors alike. IIT Palakkad is entering a new phase of expansion and creativity, thanks to its highly skilled professors, accomplished students in academics and extracurriculars, dedicated staff, and advanced research facilities.

2. ABOUT THE POST-GRADUATE PROGRAMS

2.1 MTech Programs

The Four-semester MTech Programs are offered in six specialisations at the institute. They are based on the credit system and provide a student with a wide choice of courses. The curricula are drafted carefully to provide the students with realistic Engineering and Technological exposure with a strong theoretical foundation. Each program comprises several core and elective courses and project work. The six MTech Programs for the academic year 2024-25 and the minimum educational qualifications are given in the Table-1.

Table-1: Minimum Educational Qualifications for the MTech Programs

Program	Minimum Educational Qualifications
Computing and Mathematics	1. To be eligible for the regular category of admission, candidates must possess i. a valid GATE score in **CS/MA** and ii. either a four-year bachelor's degree in STEM (Sciences/ Technology/ Engineering/Mathematics) or a master's degree in Sciences / Mathematics. 2. To be eligible for other categories of admission where a GATE score is not mandatory as per the institute regulations (such as sponsored category, CFTI degree holders etc.), candidates must possess one of the following. i. a four-year bachelor's degree in Engineering/Technology in Computer Science and Engineering / Information Technology ii. a four-year bachelor's degree with Mathematics as a major iii. a master's degree in Mathematics
Data Science	1. Four-year UG degree (BE, BTech, or BS) in any discipline or MSc - in Data Science/ Artificial Intelligence/ Machine Learning/ Mathematics/ Statistics/Applied Mathematics/ Physics 2. GATE qualification in **DA/ CS/ EC/ EE/ MA/ ST/ PH/ CE/ ME**
Geotechnical Engineering	1. UG degree in Civil Engineering 2. GATE qualification in **CE** for HTTA
Manufacturing and Materials Engineering	1. UG degree in Mechanical Engineering/ Production Engineering/ Manufacturing Engineering/ Metallurgical & Materials Engineering/ Metallurgical Engineering/ Manufacturing Technology/ Industrial & Production

	Engineering/ Material Science Engineering/ Materials Engineering. 2. GATE qualification in **ME/ PI/ MT** for HTTA
Power Electronics and Power Systems	1. UG degree in Electrical Engineering / Instrumentation Engineering / Electrical and Electronics Engineering 2. GATE qualification in **EE** for HTTA
System-on-Chip Design	1. BTech/BE in one of the following branches: Electrical Engineering/ Electronics Engineering/ Electronics and Communication Engineering/ Instrumentation Engineering/ Instrumentation and Control Engineering/ Telecommunication Engineering/ Electronics and Telecommunication Engineering/ Electrical and Electronics Engineering/ Electronics and Instrumentation Engineering/ Computer Engineering and Information Technology/ Computer Science and Engineering/ Computer Engineering/ Computer Science and System Engineering/ Electrical Engineering and Computer Science/ Electronics & Computer Engineering/ Information and Communication Technology/ Information Science and Engineering/ Computer Science/ Electronic Instrumentation and Control Engineering/ Information Technology 2. Valid GATE Score (in **EE/ EC/ IN/ CS**).

Candidates must be Indian Nationals. Candidates should have valid GATE scores (Qualified in GATE 2024/2023/2022).

2.2 MSc Programs

The postgraduate program of MSc in the disciplines of Chemistry, Mathematics, and Physics, is intended to take the students to a higher and specialised realm in the respective disciplines. MSc at IIT Palakkad is a Four-semester program. The minimum educational qualifications for admission to the MSc programs of IIT Palakkad are given in

the Table-2.

Table-2: Minimum Educational Qualifications for the MSc Programs

Program	Minimum Educational Qualifications
Chemistry	• JAM (Joint Admission test for Masters) qualified in Chemistry (CY) • No restrictions at 10+2 level • Bachelor's degree
Mathematics	• JAM qualified in Mathematics (MA) or Mathematical Statistics (MS) • No restrictions at 10+2 level • Bachelor's degree (with at least four Mathematics courses as a part of the bachelor's degree program)
Physics	• JAM (Joint Admission test for Masters) qualified in Physics (PY) • No restrictions at 10+2 level • Bachelor's degree

2.3 Half-Time Teaching Assistantship (HTTA) for the students (of Indian origin only) admitted to the MTech programs

Financial assistance in the form of a Half-Time Teaching Assistantship (HTTA) at the rate of Rs.12,400/- (Rupees Twelve Thousand Four Hundred Only) per month, which is tenable for a maximum period of 24 months, will be awarded to the students of Indian National joining the MTech programs, as per the extant rules of the institute.

The candidates admitted **under the Category-A of Section 3.1 only** are eligible for HTTA. Such students are required to assist with the academic and curricular activities of the institute for at least eight hours per week. These activities could be related to activities such as laboratory demonstrations, tutorials, evaluations of assignments, test papers, seminars, research projects, etc.

2.4 Scholarships and financial assistance for the students (of Indian origin only) admitted to the MSc programs

The institute facilitates Scholarships through the National Scholarship Portal (NSP - https://nsp.gov.in/), for the students admitted to the MSc programs. For more details on the scholarships and financial assistance, please visit

https://iitpkd.ac.in/scholarships-and-financial-assistance

2.5 Reservation of Seats

Reservation of seats for the Indian Nationals under the prescribed categories, SC/ ST/ OBC (Non-Creamy layer), PwD (Persons with Disability) and Economically Weaker Section (EWS) of the General Category, is followed as per the extant rules of the Government of India.

3. ADMISSION TO THE MTech PROGRAMS

3.1 Who can apply?

(A) REGULAR CANDIDATES

Candidates qualified in **GATE 2024 / 2023 / 2022** and satisfying one or more of the qualifications given in Table-1. The candidates from the following categories are eligible to apply.

(i) Bachelor's degree** in Engineering /Technology from educational Institutions approved by AICTE/ Government of India.

(ii) Degrees obtained through Distance Education/ correspondence mode for the qualifying degree.

(iii) Associate Membership holders of professional bodies for admission into their parent disciplines.

The Institute reserves the right to conduct a suitability test/ an interview for screening in the cases under the categories (ii) and (iii) above.

The candidates who are yet to appear or have appeared in the final examination for the qualifying degree specified in [(i), (ii) or (iii)] and whose results are likely to be declared by the third week of July 2024 are only eligible to apply.

** If the degree is issued by a university/institution in countries other than India, the same must be recognized by Association of Indian Universities (AIU)/ Commonwealth Universities/ International Association of Universities (IAU), as equivalent to the corresponding Indian Degrees/ Certificates. Additional requirements of GRE/ TOEFL are also required for Foreign candidates whose medium of instruction in the preceding degree is not in English.

(B) SPONSORED CANDIDATES

Candidates sponsored by the Industries, established Institutes/ R&D Organizations/National laboratories, who are **fulfilling the educational qualifications listed in Table-1,** are eligible to apply, provided (a) the employer grants two years of study leave and (b) the employer undertakes to financially support the candidate for the entire duration of two years. **The candidates who seek admission under the sponsored category do not require GATE qualification.**

(C) FOREIGN NATIONALS

Foreign nationals who have a bachelor's degree in Engineering / Technology and a valid GRE score are eligible to apply. GRE score is not mandatory for foreign nationals whose preceding degree is in English as the medium of instruction.

(D) CANDIDATES SPONSORED BY THE MINISTRY OF DEFENCE

Candidates who are sponsored by the Defence Authority (Research & Training and Post Graduate Training), for admission to the MTech programs, are selected through a separate procedure, as followed by the Ministry of Defence. **The candidates who are sponsored by the Ministry of Defence do not require GATE qualification.**

3.2 How to Apply?

Applications for the MTech program should be submitted in **ONLINE mode only**. **For submission of applications ONLINE, please click** https://pgadmit.iitpkd.ac.in Instructions and more details are available on this website.

Application Timeline	
Opening Date	**27th of March, 2024**
Closing Date	**26th of April, 2024 (23:59 hours)**
Application Fee	
SC/ ST/ Female/PwD/Transgender	**Rs.250/-**
All Other Candidates	**Rs.500/-**

4. ADMISSION TO THE MSc PROGRAMS

4.1. Who can apply?

The candidates who have qualified in JAM (Joint Admission test for Masters) and who fulfil the minimum educational qualifications as in the Table-2 of Section 2.2 are ONLY eligible for applying to the MSc programs.

4.2. How to apply?

Application for admission to the MSc programs of IIT Palakkad should be done through the JAM 2024 portal of IIT Madras, the details of which can be viewed at https://jam.iitm.ac.in/

5. WHOM TO CONTACT IN CASE OF QUERIES?

PG Admission Committee

Indian Institute of Technology Palakkad,

Kanjikode West, Palakkad, Kerala - 678 623.

Please write to us in case of any queries to pgadm@iitpkd.ac.in or contact us at +91-491-209 2035/36 (queries will be answered during office hours (from 9 am to 5 pm) on all working days).

6. GENERAL INFORMATION AND IMPORTANT POINTS

I. The application fee should be paid through ONLINE mode only through the appropriate portal. Other modes of payment **will not be accepted** and will be subject to rejection of the application. **The proof of payment / transaction shall be uploaded while filling up the application form at the appropriate place.**

II. The application fee, once paid, will not be refunded under any circumstances.

III. Incomplete applications and applications without proper supporting documents will be summarily rejected. The institute will not be responsible for any incomplete applications and will not seek or entertain corrections of any sort from the candidates once the applications are submitted by the candidates. It is the sole responsibility of the candidates to check thoroughly and satisfy themselves before submitting.

IV. **Candidates should submit separate applications for each program they are applying for and application fee needs to be paid for each such application**

separately and the transaction details should be cited and proof of payment should be attached while submitting the application. In case of receipt of multiple applications from the same candidate with the same payment reference and supporting document, only one application will be considered by the institute and the rest will be rejected.

V. Candidates are advised to submit their applications well in advance and avoid last-minute rush. The dates for submission of the applications will not be extended for any reason.

VI. While applying for the MTech admission, **the candidates shall register in the Common Offer Acceptance Portal (COAP).** IIT Palakkad is one of the participants in the Common Offer Acceptance Portal (COAP), which provides a common platform for a candidate to make the most preferred choice for admission to an MTech program of the participating institutes such as the IITs and the IISc. It is essential and mandatory that the applicants register with the **COAP 2024 portal** (**https://iitk.ac.in/coap2024/**) before they apply to the MTech programs of IIT Palakkad. Applications without a valid COAP registration number will be rejected outright.

VII. Upon successful completion and submission of the online application for an MTech program, the PDF of the submitted application will be emailed to the registered mail address for reference and records. Candidates are advised to have a valid email address for this purpose. There is **NO** need to send the hard copy / printed version to IIT Palakkad.

VIII. Please have the following supporting documents (as applicable) ready in PDF format, while submitting the application.

A. Proof of Date of Birth (Birth Certificate or SSLC or equivalent Certificate)
B. Community / Category Certificate (GEN-EWS/OBC-NCL/SC/ST/PwD)
C. Nationality
D. Qualifying Degree Certificate
E. GATE Score Card (2024/2023/2022)
F. Proof of Payment of Application Fee (Separate Fee Receipts in case of submission of multiple applications by the same candidate)

7. FEE STRUCTURE, SEAT ACCEPTANCE FEES, AND REFUND POLICY

7.1. Fee Structure

S. No.	Particulars	MTech Indian, OCI/PIO/SAARC (INR)	MSc Indian, OCI/PIO/SAARC (INR)	Other Nationals (INR)
A. ONE TIME FEES (For students seeking fresh admission)				
1	Admission Fee	300.00	300.00	300.00
2	Grade Card / Thesis Fee	300.00	300.00	300.00
3	Provisional Certificate	150.00	150.00	150.00
4	Alumni Life Membership Fee	1,500.00	1,500.00	1,500.00
5	Modernization Fee	300.00	300.00	300.00
6	Student Welfare Fund	700.00	700.00	700.00
7	Publication Fee	250.00	250.00	250.00
8	Institute Caution Deposit (Refundable)	1,000.00	1,000.00	1,000.00
9	Library Caution Deposit (Refundable)	1,000.00	1,000.00	1,000.00
10	Convocation Fee	2,000.00	2,000.00	2,000.00
	Subtotal A	**7,500.00**	**7,500.00**	**7,500.00**
B. INSTITUTE FEES (per semester for all students)				
1	Tuition Fee (Statutory) #	5,000.00	3,000.00	100,000.00
2	Examination Fee	500.00	500.00	500.00
3	Registration - Enrollment Fee	300.00	300.00	300.00
4	Hostel Seat Rent *	6,500.00	6,500.00	6,500.00
5	Electricity, Water and SWD Charges *	1,200.00	1,200.00	1,200.00
	Subtotal B (for day scholars)	**5,800.00**	**3,800.00**	**100,800.00**
	Subtotal B (for hostellers)	**13,500.00**	**11,500.00**	**108,500.00**
C. ONE-TIME HOSTEL FEES (for students newly admitted to hostels)				
1	Hostel Caution Deposit * **(Subtotal C)**	**3,500.00**	**3,500.00**	**3,500.00**
D. STUDENTS' SECTOR FEES & ADVANCE DINING CHARGES (per semester for all students)				
1	Medical Insurance (revised every semester)	1,000.00	1,000.00	1,000.00
2	Wellness Fee (revised every semester as per the actuals)	1,200.00	1,200.00	1,200.00
3	Gymkhana Fee (revised every year)	1,600.00	1,600.00	1,600.00
4	Establishment A	5,500.00	5,500.00	5,500.00
5	Hostel Admission Fee *	200.00	200.00	200.00
6	Establishment B *	1,500.00	1,500.00	1,500.00
7	Advance Dining Charges * (settled against mess bills)	28,500.00	20,000.00	28,500.00
	Subtotal D (for day scholars)	**9,300.00**	**9,300.00**	**9,300.00**
	Subtotal D (for hostellers)	**39,500.00**	**31,000.00**	**39,500.00**
*** For hostellers only. Dining charges for MTech is for 6 months and 4 months for MSc**				
# Tuition fee is waived for SC/ST students (Indian Nationals only)				

7.2. Seat Acceptance Fees

The Seat Acceptance Fees as indicated in the table below shall be paid by the candidates who are provisionally offered to join the MTech / MSc programs. The details of the mode of fee remittance will be indicated in the Provisional Offer Letter issued by the institute after each Round of the COAP 2024 admission process. This will be adjusted with the total fee to be remitted by the candidate at the time of final payment. For the candidates who have submitted applications for admission to the MSc programs through the JAM 2024 portal will be required to pay the Seat Acceptance Fee as per the instructions laid down in the JAM 2024 portal.

S. No.	Program	Seat Acceptance Fee (INR)	
		GEN/OBC/EWS	SC/ST/PwD
1	MTech / MSc (Regular)	10,000	5,000
2	MTech (Sponsored)	10,000	5,000
3	MTech (Sponsored by Defence)	10,000	5,000

7.3. Refund Policy

If a candidate withdraws his/her admission on or before the official joining date, the amount paid by him/her will be refunded after deducting the Seat Acceptance Fee paid by the candidate.

Once the candidate is admitted, he/she is considered to be on the rolls of the institute. For such candidates, **only the caution deposits will be refunded**.

The Official Date of Joining is the Date of the Commencement of the Institute's Orientation Program, which will be mentioned in the Welcome Letter.

8. MAJOR HIGHLIGHTS OF DISCIPLINES AT IIT PALAKKAD

8.1. Biological Sciences and Engineering (BSE)

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

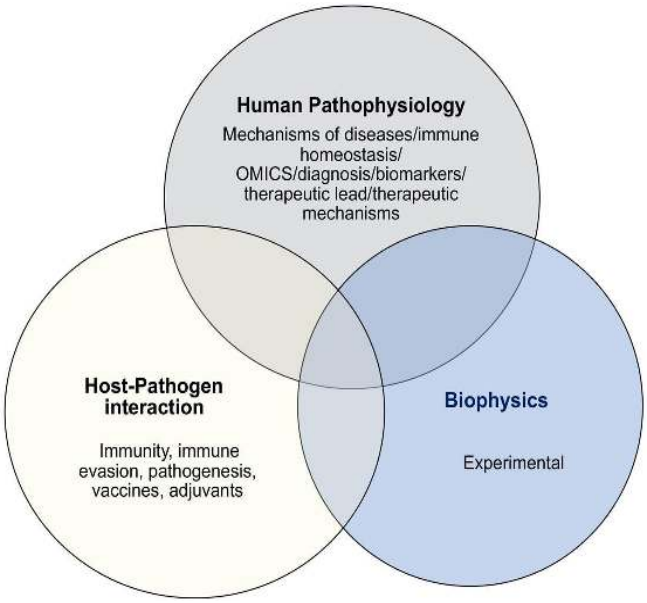
The current focus of the department is on

i) Human pathophysiology

ii) Host-pathogen interaction

iii) Diagnosis of diseases

iv) Biophysics



The current faculty members and their main interests are

Primary affiliation

Prof. Jagadeesh Bayry MVSc, PhD (Sorbonne University, Paris, France): Immunology, Immunotherapy, host-pathogen interaction

Dr. Abdul Rasheed P PhD (NIT Calicut) (*DBT Ramalingaswami fellow*): Biosensors, early stage disease diagnosis, nanomaterials, microbial corrosion

Secondary affiliation

Dr. Sushabhan Sadhukhan PhD (Case Western Reserve University, Cleveland, Ohio, USA): Chemical biology, proteomics, metabolomics, and development of small molecule inhibitors

Dr. Bibhu Ranjan Sarangi PhD (Raman Research Institute, Bangalore): Experimental biophysics and physics of cancer

The department will be expanded during the coming years with a 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.

Research facilities

Excellent state-of-the-art research facility is coming up at Nila 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.

8.2. Chemistry

The Faculty

Dr. Debarati Chatterjee, PhD (IISc, Bangalore)

Dr. Dinesh Jagadeesan, PhD (JNCASR, Bangalore)

Dr. Mintu Porel, PhD (University of Miami, USA)

Dr. Padmesh A, PhD (Massey University, New Zealand)

Dr. Rositha Kuniyil, PhD (BIST, Spain)

Dr. Supratik Sen Mojumdar, PhD (IACS, Kolkata)

Dr. Sushabhan Sadhukhan, PhD (Case Western Reserve University, USA)

Dr. Shanmugaraju Sankarasekaran, PhD (IISc, Bangalore)

Dr. Yugender Goud Kotagiri, PhD (NIT, Warangal)

Dr. Yuvaraj Kuppusamy, PhD (IIT Madras)

Prof. V. Haridas (Visiting faculty from IIT Delhi)

Prof. Viswanathan Kumar (Honorary Professor)

In the initial years from 2015, the Discipline of Chemistry was involved in instructional work of the BTech courses. In July 2017, the department took a leap to start its PhD program. Currently, a total of 39 PhD scholars, 5 postdocs, 10 project staff are working in various areas of theoretical and experimental chemistry under the guidance of the highly motivated faculty of the department. Department of Chemistry is a young and vibrant community continuously aspiring to define success in terms of excellence in research and teaching. Well-equipped with state of the art facilities, we are engaged in teaching and research in theoretical and experimental areas spanning across the chemistry of life to sustainable living. Currently there are 13 faculty members and 4 staff in the department. The department is engaged in research in the following 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
- 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-organic chemistry, Chemical biology
- Electro-analytical chemistry and Nano-biosensors
- Main group and Organometallic chemistry
- Computational Organic Chemistry
- Transition metal Catalysis
- Small molecule activation
- Insilico catalyst design and Machine learning

MSc Program in Chemistry

Students with a bachelor's degree in basic sciences with Chemistry as a subject for at least two years are eligible for the MSc in Chemistry in IITPKD. The curriculum of MSc (Chemistry) of IIT Palakkad has been developed in a modern and effective format instead of following a traditional framework. The emphasis is to help students to have a sufficient breadth of knowledge on the different sub-disciplines in chemistry while delving deeper in their preferred area. This is a four semester program with the courses designed around a common theme emphasising synthesis, structure, energetics and dynamics. Under this common theme, several important theoretical and experimental fundamentals of Physical, Inorganic, Organic and interdisciplinary topics shall be covered. The first two semesters consist of common core courses, whereas, the higher semesters will contain electives and projects as major components. The laboratory courses are designed to impart training in both theory and experimental skills. This curriculum will be helpful for the students who aspire to pursue their higher studies in future and will be crucial to get them exposed to basic research activities.

Facilities

The department has an undergraduate and a postgraduate chemistry which are well equipped with several basic Physical, Inorganic, and Organic experimental infrastructure such as

- Analytical balance
- 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
- Two port Glove box

Sophisticated analytical facilities in chemistry for research and teaching

Glove box used for battery applications and to handle highly Air and Moisture sensitive compounds

A number of analytical equipment required for chromatography and spectroscopy such as TG-DTA-MS, Benchtop NMR, FT-IR, Chemisorption, UV-vis, and Fluorescence spectrophotometer are available. In addition to this, for conducting advanced research, 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 Fabrication Facility (CMFF). As a part of the central facilities, sophisticated instruments (relevant to the field of chemistry) such as High-performance liquid chromatography (HPLC), Liquid Chromatography-Mass Spectrometry (LC-MS), Thermal Gravimetric Analysis, gas Chromatography, FT-IR, Raman and Fluorescence spectrophotometers, Automated Flow Chemisorption, Scanning Electron Microscope, X-ray diffractometer and a bench-top Nuclear Magnetic Resonance (NMR) spectrometer for analysis and characterization of samples are already set for use. For more details about the department of chemistry, you may visit https://chemistry.iitpkd.ac.in/. Further details of

the available central facilities at IIT Palakkad can be seen at https://cif.iitpkd.ac.in/.

The Institute is also in the process of setting up a sophisticated NMR facility.

UG / PG Lab of the discipline of Chemistry

8.3. Civil Engineering

The Faculty

Dr. Ankesh Kumar, PhD (IIT Delhi)

Dr. Arun C. O, PhD (IIT Madras)

Dr. Athira P, PhD (IIT Madras)

Dr. B. K. Bhavathrathan, PhD (IIT Bombay)

Dr. C. V. Veena Venudharan, PhD (IIT Kharagpur)

Dr. Divya P. V , PhD (IIT Bombay)

Dr. Gokulnath C, PhD (IIT Madras)

Dr. Anil Kumar M. V, PhD (IIT Madras)

Dr. Madhu Karthik M, PhD (Texas A&M University, USA)

Dr. Praveena Gangadharan, PhD (IIT Madras)

Dr. Rakesh J. Pillai, PhD (IIT Madras)

Dr. Sanjukta Chakraborty, PhD (IIT Kanpur)

Dr. Sarmistha Singh, PhD (Auburn University)

Dr. Senthilkumar V, PhD (IIT Madras)

Dr. Subhasis Mitra, PhD (Auburn University, USA)

Dr. Sudheesh T K, PhD (The University of Florida, USA)

Dr. Deepak Jaiswal, PhD (Pennsylvania State University, USA)

Dr. Sunitha K Nayar, PhD (IIT Madras)

Civil Engineering is one of the four BTech programs that are being offered at IIT Palakkad since its inception in 2015. PhD and MS programs in Civil Engineering, with specialisations in Structural, Geotechnical, Water Resources, Transportation and Environmental Engineering started in July 2017. A total of 55 research scholars (43 at PhD level and 12 at Masters level) are currently enrolled in the research-oriented programs. The Discipline of Civil Engineering started offering a two-year MTech program with a specialisation in Geotechnical Engineering in the academic year 2019-20. The MTech program has an annual intake of 15 students, with the curriculum focused towards addressing current issues and the multitude of challenges that the state faces with regard to Geotechnical Engineering. In a short span of four years, the Civil Engineering stream has successfully set up all basic labs for the BTech program. In addition, several advanced labs have also been set up for use by the undergraduate and postgraduate students and to execute research projects.

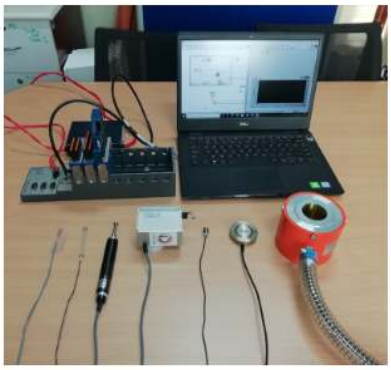
Some basic laboratory equipment

The eighteen 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 in research to the students in Civil Engineering. The areas of research in Civil Engineering are quite diversified and include:

- Pavement materials, maintenance and rehabilitation, sustainable pavements.
- Characterization of construction materials and special concrete, fibre reinforced concrete.
- Planning design phases and process management, lean construction, automation in construction, policy making in infrastructure projects.
- Bioelectrochemical systems for wastewater treatment, desalination, defluoridation, nutrient recovery from urine, metal reduction and recovery.
- Ground improvement and soil stabilisation, geosynthetics, green

geotechnics, cyclic behaviour of soils, constitutive modelling in geomechanics, deep foundations, soil-structure interaction, rock mechanics, underground structures and slope stability.

- Predictions in ungauged basins, hydrological modelling and uncertainty analysis, hydroclimatology, water policy analysis, climate and anthropogenic impacts on surface and groundwater hydrology.
- Buckling and post-buckling behaviour of thin-walled open sections, reinforced and prestressed concrete, deteriorating structures, vibration control using passive and feedback control mechanisms, optimal control, and base isolation, stochastic mechanics, structural reliability, fracture and damage mechanics.
- Urban road networks, traffic flow modelling and simulation, network disruption, and transportation systems & simulation.



Some advanced laboratory facilities

The faculty members of Civil Engineering are also actively involved in executing several state specific projects such as:

- Climate and land use change impact analysis on Bharathapuzha river Basin Drought preparedness in Kerala: A comprehensive assessment with respect to climate change
- Site inspection for feasibility of preliminary geotechnical investigation for rail fencing at Walayar range Stability study on elephant guard fence in Anakulam, Munnar
- Three-day short term course on roadway materials, design and Construction organised for for Kerala PWD engineers
- Ground improvement and integrity of existing BPCL cross-country pipelines, Cochin, Kerala
- Sustainable and resilient environment friendly solutions for hill road design through a pilot study on Manarcad-Chinnathadagam road

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.

MTech in Geotechnical Engineering

The major objective of the program is to train and prepare students for a career in Geotechnical Engineering in accordance with the current industrial needs. It is also intended that the program develops a passion and a firm base for research at doctoral level (PhD). The program offers courses in various specialised areas of Geotechnical Engineering, such as soil mechanics, geotechnical investigation, foundation engineering, ground improvement techniques, environmental geotechnics, slope stabilisation, retaining structures, rock mechanics and underground structures, and soil dynamics to name a few. The course work is broadly divided into core and elective courses. While the core courses are meant to provide a solid foundation to the MTech students in Geotechnical Engineering, the elective courses offer the students the flexibility to choose courses that best suit their future career aspirations. The elective courses include advanced topics that are relevant to current industry requirements. The program has also been planned meticulously to have a good blend of theory and practice, wherein, in addition to the theory courses, students are exposed to experimental methods and the computational/modelling aspects of geotechnical analysis and design.

The Geotechnical Engineering laboratory is well equipped with all the basic equipment for the characterization of geomaterials and advanced testing equipment. The state-of-the art advanced testing equipment currently includes automated static and cyclic triaxial systems, computerised direct shear system, automated consolidation apparatus, computer-controlled flexible wall permeameter, and large soil-geosynthetic interface resistance testing system. In addition, X-ray Diffractometer (XRD) and Scanning Electron Microscopy (SEM) are available in the Central Instrumentation Facility (CIF) of the Institute. The Institute is in the process of procuring additional advanced equipment and various sensors for model and large– scale geotechnical studies.

The institute has a state-of-the-art High-Performance Computing Cluster (HPC) 'Chandra' that is available to the students, research scholars, staff and faculty. Computational facilitates for conducting studies in geotechnical engineering include ABAQUS, PLAXIS 2D, PLAXIS 3D, ANSYS, GeoStudio 2018 (SLOPE/W, SEEP/W, SIGMA/W, QUAKE/W, TEMP/W) for finite element modelling of geotechnical problems, FB-Multipier and FB-Deep (educational version) for individual and group analyses of deep foundation and MATLAB and other programming software packages. Purchase of additional relevant software packages is underway.

Photographs of some of the facilities in the Geotechnical Laboratory are given in the following pages.

Automated Cyclic Triaxial System

Computerised Static Triaxial System and Flexible Wall Permeameter

Automated Direct Shear System and Consolidation Test apparatus

Large Soil-Geosynthetic Interface Resistance Testing System

Grout Pump for Field Tests

8.4. Computer Science and Engineering

The Faculty

Dr. Albert Sunny, PhD (IISc, Bangalore)

Dr. Anish Hirwe, PhD (IIT Hyderabad)

Dr. Deepak Rajendraprasad, PhD (IISc, Bangalore)

Dr. Jasine Babu, PhD (IISc, Bangalore)

Dr. Koninika Pal, PhD (Technical University, Kaiserslautern)

Dr. Krishnamoorthy Dinesh, PhD (IIT Madras)

Dr. Krithika Ramaswamy, PhD (IIT Madras)

Dr. Piyush P. Kurur, PhD (IMSc, Chennai)

Dr. Pratik Ghosal, PhD (University of Wroclaw, Poland)

Dr. Sahely Bhadra, PhD (IISc, Bangalore)

Dr. Sandeep Chandran, PhD (IIT Delhi)

Dr. Satyajit Das, PhD (University of South Brittany, France, University of Bologna, Italy)

Dr. Srimanta Bhattacharya, PhD (ISI, Kolkata)

Dr. Unnikrishnan Cheramangalath, PhD (IISc, Bangalore)

Dr. Vivek Chaturvedi, PhD (Florida International University, USA)

The Computer Science and Engineering (CSE) department in Indian Institute of Technology Palakkad offers undergraduate, graduate and doctoral programs. The CSE 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 in 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 at CSE Department, IIT Palakkad

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

1) **Theoretical Computer Science**: Algorithms, Complexity Theory, Cryptography, Combinatorial Optimization, Probabilistic Computing, Graph Theory, Combinatorics, Discrete Mathematics, Computational Algebra.

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, Operating Systems, High Performance Computing, 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.

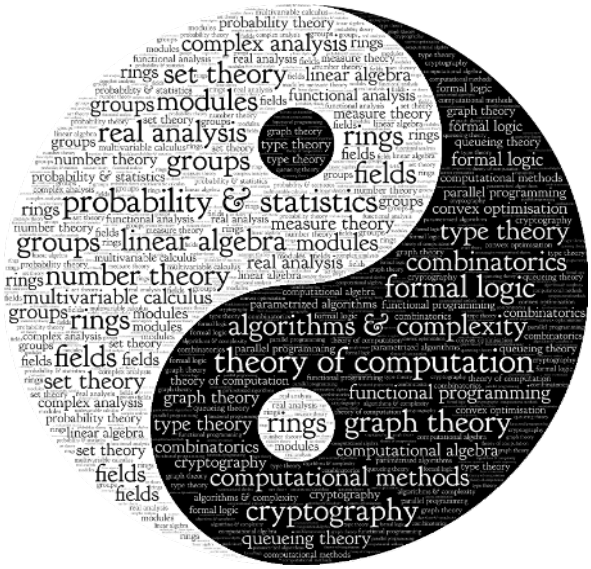
The CSE faculty members are active in research and continuously engage with industry and academia around the globe. They have active research collaborations with world class Universities such as Nanyang technological University Singapore, University of Alberta Canada, Aalto University Finland, University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

Bologna Italy to name a few.

Interdisciplinary Master's programs

(i) MTech in Computing and Mathematics

Computing and Mathematics have been tied together ever since the notion of computability was formalised. Algorithmic procedures accompanied by their well founded mathematical proofs of guarantees are integral components of computational problem solving. The focus of this program is to cover some aspects of this interrelationship between Computing and Mathematics. The program offers a unique mix of computer science courses with supporting mathematics courses that together cover theoretical and practical aspects of computation. The targeted audience come from two backgrounds (1) Computer Science and Engineering (2) Mathematics, thus providing an opportunity for diverse peer learning to the students.



The objective of the program is to train students in areas which are integral to both Computing and Mathematics. To facilitate this goal, the first semester will comprise an appropriate set of bridge courses for the students depending on their background. That is, students from the Mathematics background will be trained in certain basic core courses from computer science and students from the Computer Science background will be trained in some core mathematics courses. This would make the advanced elective courses

offered in both the domains accessible to all students in the subsequent semesters.

Major areas include Algorithms, Graph Theory, Combinatorics, Logic, Programming Languages, Computational Methods, Foundations of Data Science & Machine learning, Probability & Statistics and Linear Algebra. The program culminates with a year-long project/dissertation in the second year that prepares students to pursue careers that require innovations involving sophisticated applications of mathematics in computer science.

For more information, visit : https://iitpkd.github.io/mcam/

(ii) MTech - System on Chip Design (SoCD)

With deep-penetration of Intelligent Systems into our everyday lives through advances in the Internet-of-Things (IoT), there is an increased demand for highly-skilled engineers in both academia and industry who can take an idea and develop it into a fully-functional system. Developing such cutting-edge, state-of-the-art systems require deep expertise in a wide-range of fields such as system design, circuit design, physical design, device design, verification, testing and validation. MTech in System-On-Chip Design (SoCD) is a program that caters to this demand for highly-skilled and well-trained engineers.

This is an interdisciplinary program offered jointly by the Computer Science and Engineering (CSE) and Electrical Engineering (EE) Disciplines at IIT Palakkad. The curriculum of this course has been designed by experts from Industry and academia to

cover both the fundamentals, as well as the engineering aspects of designing and developing IC based systems. The MTech curriculum is well-balanced where every course has a companion lab component and prescribes a year-long project. This gives a firm platform for graduating students to excel in industry or academia. Infact, our students are doing internships at leading chip design and manufacturing companies such as Intel, AMD, Qualcomm, etc. For more information, visit : https://iitpkd.github.io/msocd/

The facilities at IIT Palakkad include latest boards and software from ARM, Cadence, Xilinx necessary for developing modern Systems-On-Chip. We also have a micro-nano device fabrication facility with class 1 lakh and 10000 cleanrooms, and a characterization facility.

For more details on the Department of Computer Science and Engineering, please visit https://cse.iitpkd.ac.in

8.5. Data Science

The Faculty

Dr. Sahely Bhadra, PhD (IISc, Bangalore)

Dr. Narayanan Chatapuram Krishnan, PhD (Arizona State University, USA)

Dr. Mrinal Kanti Das, PhD (IISc, Bangalore)

Dr. Satyajit Das, PhD (University of South Brittany, France, University of Bologna, Italy)

Dr. Koninika Pal, PhD (Technical University Kaiserslautern, Germany)

The Department of Data Science aims to provide world-class education, pursue cutting-edge research, and develop data science & artificial intelligence technologies for societal benefit. The department offers PhD, MS (by Research) and an interdisciplinary

MTech program in Data Science. A major agenda of the department is to foster industry and academic collaborations. The major areas of research in the department are Artificial Intelligence and Machine learning: Kernel Learning, Multiview Learning, Robust Optimization and Convex Optimization for Large Data, Anomaly Detection in Time Series, Privacy-aware Learning, Bayesian Models, Meta Learning, Explanabile and Interpretable Machine Learning, Generative Modeling, Fairness in Machine Learning, Human-in-the-loop Learning, Systems for Artificial Intelligence, Architecture for Deep Learning, Energy-efficient and High-performance Systems for Multimedia Applications, such as computer vision, video compression, and imaging, Energy-aware Algorithms for Signal Processing; Computer Vision: Transfer Learning, Domain Adaptation, Zero and Few-shot Learning, Applications in Text Recognition, Plant Disease Recognition, Remote Sensing, Information Retrieval and Natural Language Processing, Harvesting Knowledge from Text and Web Tables, Knowledge Base Curation, Question-Answering, Building Smart Indices for Efficient Similarity Search, Scientific Document Understanding; Information Theory and Statistics: Statistical Learning and Inference, Federated learning.

MTech in Data Science

The Department of Data Science offers an MTech in Data Science. A major highlight of the program is its interdisciplinary nature with four engineering streams (CSE, EE, CE, ME) and three science streams (Physics, Mathematics, Humanities & Social Sciences) participating in the program in addition to Data Science. The curriculum was developed by leading data scientists in the country making it relevant for the current and future requirements of Data Science in the industry as well as in academic research. The Department of Data Science comprises young yet experienced researchers in various fields of data science, artificial intelligence, machine learning, statistics, information theory, and several application areas like climatology, traffic engineering, fluid mechanics, data security, econometrics, linguistics, material science etc. Students from various backgrounds are admitted to the program. They will go through foundational training, e,g, Linear algebra, Probability, Data Engineering Machine Learning Optimization, in the first semester, with more depth and breadth in various application areas in the following semesters through electives. Higher semester courses include Deep Learning, Big Data Lab, Data Security, Reinforce Learning, Kernel learning, responsible AI, etc. Core courses

in the MTech Program will be mainly instructed by faculty members from Data Science, Computer Science and Engineering, Mathematics, and Electrical Engineering.

Students will work on a year-long research or development project with state-of-the-art computational and experimental facilities that will likely lead to publications, patents, products, or software. To achieve expertise in both fields, students will be encouraged to do projects on the application of data science in their areas of specialisation. There will be ample opportunities for the students after graduation - enrolling in a doctoral program at overseas top universities or a job within or outside the country. The students will get the opportunity to learn data science in a vibrant ecosystem around the area and actively contribute to the front line research. Our MTech Data Science program is well received in the industry; More than 85% of the pioneers of the program (who came from varied backgrounds: Computer Science and Engineering, Mathematics, Electrical Engineering, Instrumentation Engineering, Mechanical engineering) have received data science related job offers from international companies.

8.6. Electrical Engineering

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, 260 students and 7 staff members engaged in cutting edge research and teaching in several frontier areas of Electrical Engineering.

The Faculty

Dr. Anirudh Guha, PhD (IISc, Bangalore)

Dr. Arun Rahul S, PhD (IISc, Bangalore)

Dr. Arvind Ajoy, PhD (IIT Madras)

Dr. Jobin Francis, PhD (IISc, Bangalore)

Dr. Manas Kumar Jena, PhD (IIT Delhi)

Dr. Naga Brahmendra Yadav Gorla, PhD (NUS, Singapore)

Dr. Nikhil Krishnan M, PhD (IISc, Bangalore)

Dr. Revathy P, PhD (IISc, Bangalore)

Dr. M. Sabarimalai Manikandan, PhD (IIT Guwahati)

Dr. Shaikshavali Chitraganti, PhD (University of Lorraine, France)

Dr. Sneha Gajbhiye, PhD (IIT Bombay)

Dr. Sreenath Vijayakumar, PhD (IIT Madras)

Dr. Subrahmanyam Mula, PhD (IIT Kharagpur)

Dr. Sukomal Dey, PhD (IIT Delhi)

Dr. Swaroop Sahoo, PhD (Colorado State University, USA)

Dr. Vijay Muralidharan, PhD (IIT Madras)

Specialisation

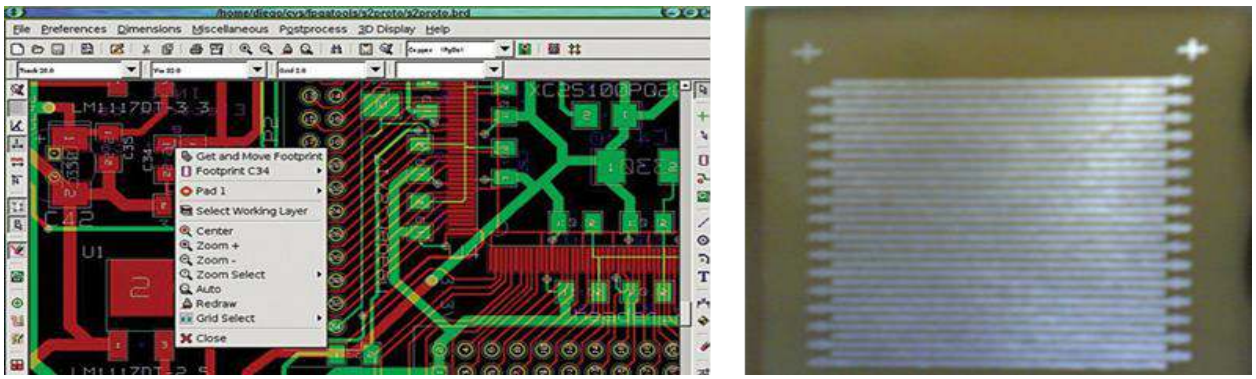
- Antennas, Microwave Engineering and Radar Systems
- Biomedical Signal Processing and Imaging
- Communication and Signal Processing
- Sensors, Measurements and Instrumentation
- Nanoelectronics, Plasmonics and Semiconductor Devices
- Power Systems and Power Electronics
- Robotics, Instrumentation and Control
- VLSI Signal Processing Circuits and Systems

Laboratories

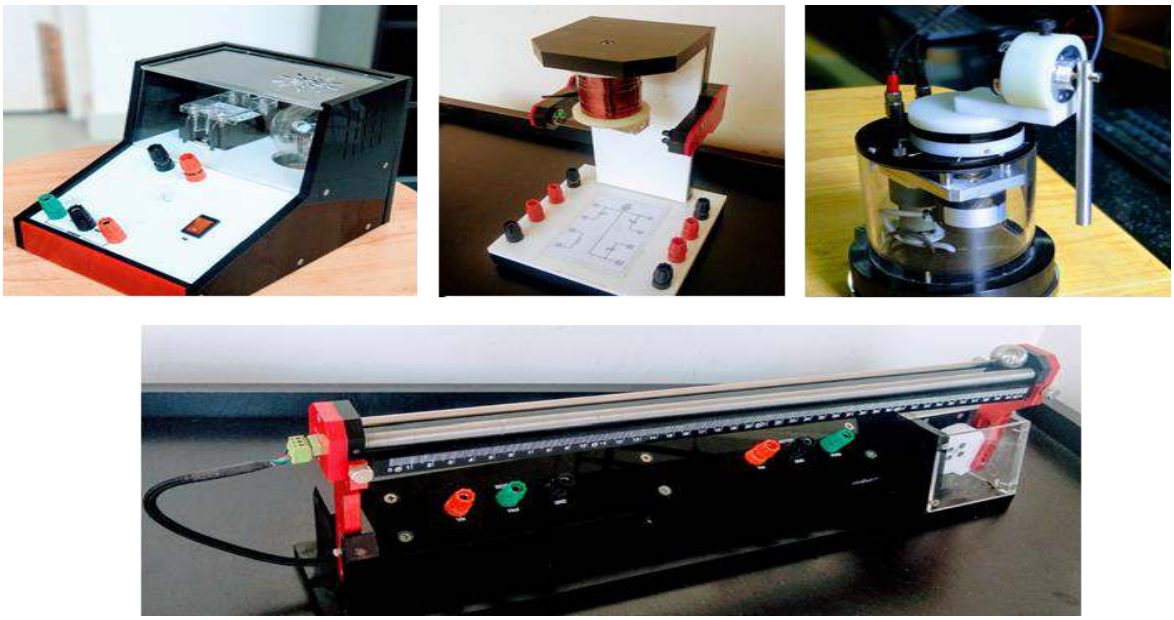
Electronics Technology Laboratory

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.

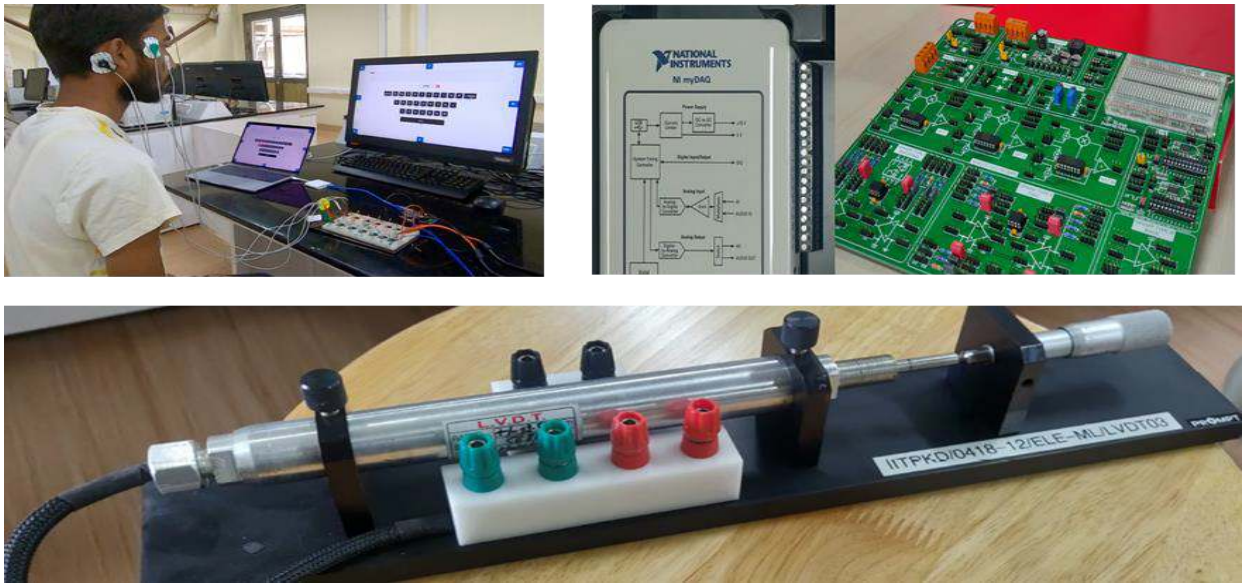
General Electronics Lab, Left: 3D Printer, Right: Typical Data Acquisition Set Up



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



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

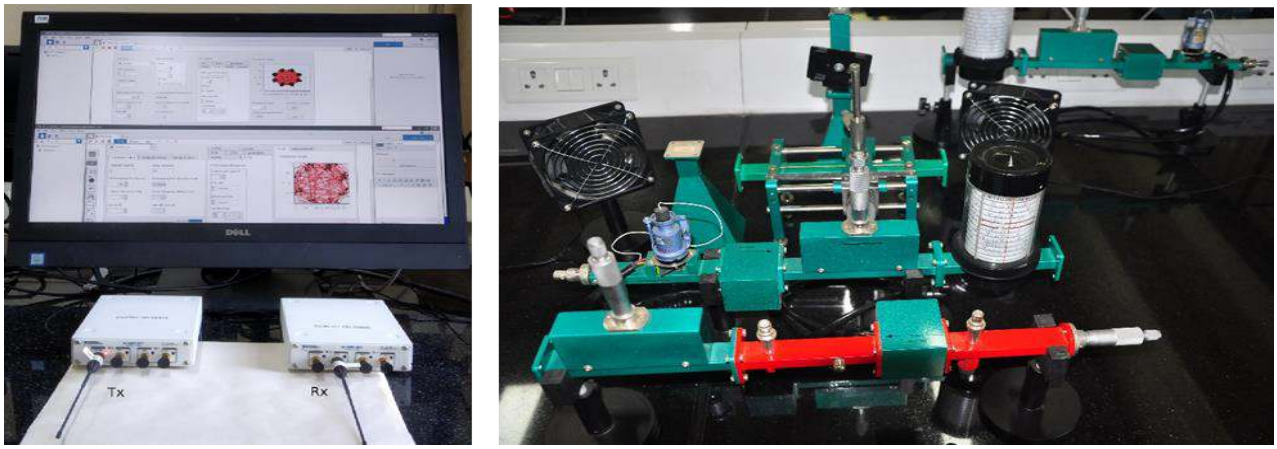


Measurements and Instrumentation Lab, In Clockwise Order from Top: Electro- oculogram EOG Data Acquisition, Analog Signal Conditioning (TI ASLK) and Data Acquisition (NI MyDAQ) and Linear Variable Differential Transformer (LVDT) setup

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.



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

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.

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

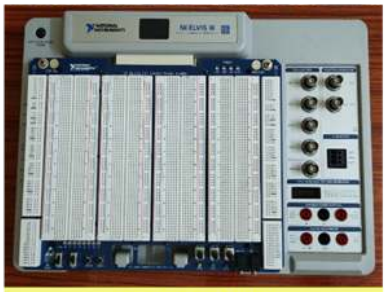
Sensors and Electronic Instrumentation Laboratory (SEIL)

Sensors and Electronic Instrumentation Laboratory (SEIL) is a complete sensor development, instrumentation and measurement research lab, which aims to design and develop various application-oriented sensors and signal conditioning circuits. Typical facilities of the lab include equipment such as Mixed Signal Oscilloscope (MSO44-Tektronix), Arbitrary Function Generator (AFG 31000- Tektronix), Digital Multimeter (DMM6500-Keithley), NI-ELVIS III, Smart Tweezers (ST5S-Ideal-tek), Infrared moisture meter, Soil moisture meters, Variable inductance and capacitance boxes.


Mixed Signal Oscilloscope (MSO44-Tektronix)


Arbitrary Function Generator (AFG 31000- Tektronix)


Digital Multimeter (DMM6500-Keithley)

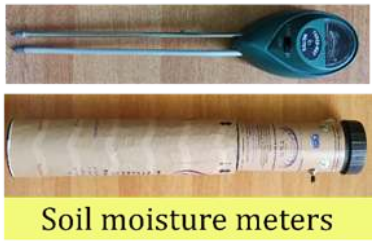

NI-ELVIS III


Infrared moisture meter


Variable capacitors


Variable inductors


Smart Tweezers


Soil moisture meters

Facilities available at SEIL

MTech in Power Electronics and Power System

Our vision in starting an MTech Program in Power Electronics & Power System is to ”Develop and maintain a high quality teaching and research environment in Power Systems, Power Electronics and Control and to emerge as a centre of excellence for contributing towards the society”

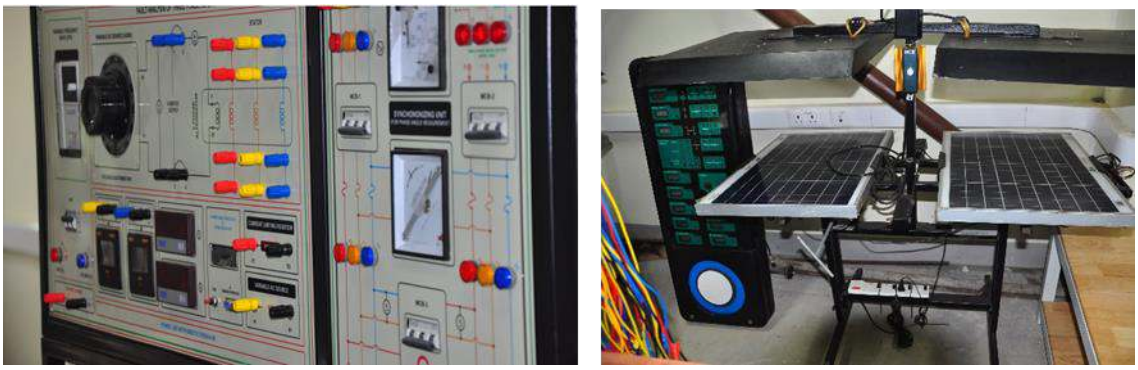
Topics in power electronics are essential for key enabling technologies and understanding of the diverse disciplines encompassed by power electronics - semiconductor devices, power converter control and its application in power systems and motor drives - is therefore important to all power engineers. The M. Tech curriculum is designed to train the students with adequate domain knowledge and skill-sets in Power Electronics & Power Systems and related subjects along with the flexibility to choose interdisciplinary electives. Thoroughly designed course contents and hands-on laboratory exercises enable students to pursue successful career options in various research programs (higher studies)

in Power Electronics / Power Systems/ Renewable Energy Systems and related areas, roles in design and development with government/ private organisations, employment in R & D organisations related to sustainable technologies etc.

The curriculum focuses on learning the concepts through design and development. Electrical engineering laboratories are well resourced with modern scientific equipment that are calibrated for accurate measurements. Well equipped laboratory facilities are installed for developing new design/testing and verifying an existing design or hardware modules. To provide more exposure towards industry standard software tools, we have research level licenses for simulation software's like PSCAD, DSA tools, Labview, Mathematica, ANSYS, MATLAB, etc.

Power Systems Laboratory

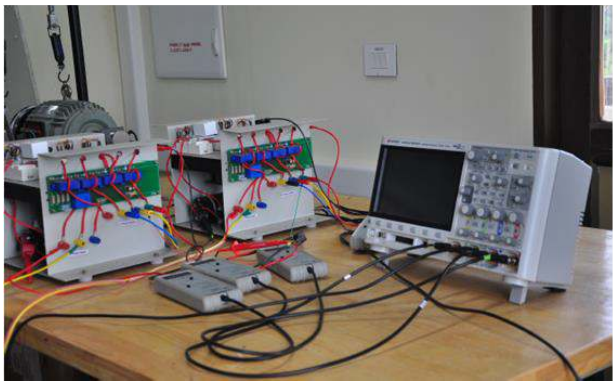
Power Systems Laboratory provides students with an environment to experiment on various aspects of power systems including safety and quality. Some of the facilities include: Fault simulator for studying and analysing various power systems faults, facility for studying parallel operation of alternators, 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 Mipower, PSCAD,PSSE , DSA Tools software for power system analysis.

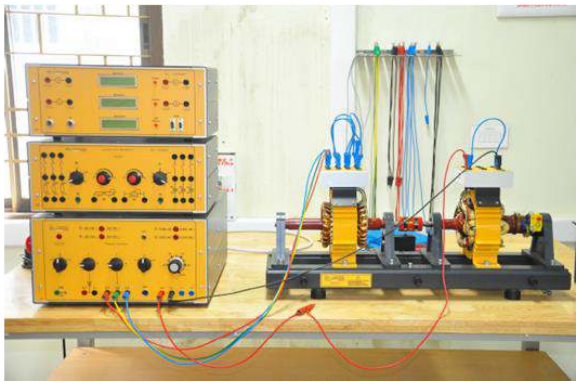


Power Systems Lab, Left: Alternator Fault Simulator With Grid Synchronization Facility, Right: Solar PhotoVoltaic Array Simulator

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 assembly,controller boards, FPGA cards, High end Oscilloscopes with differential probes for high voltage and high current measurement, Hall effect voltage and current sensors, Solar array simulators, Motor- dynamometer setups, Bidirectional power supplies etc. Experiments are designed to enhance the hands-on skills in power converter design and development, design and fabrication of magnetics, open loop and closed loop control of power converters, power converter design for various applications etc.





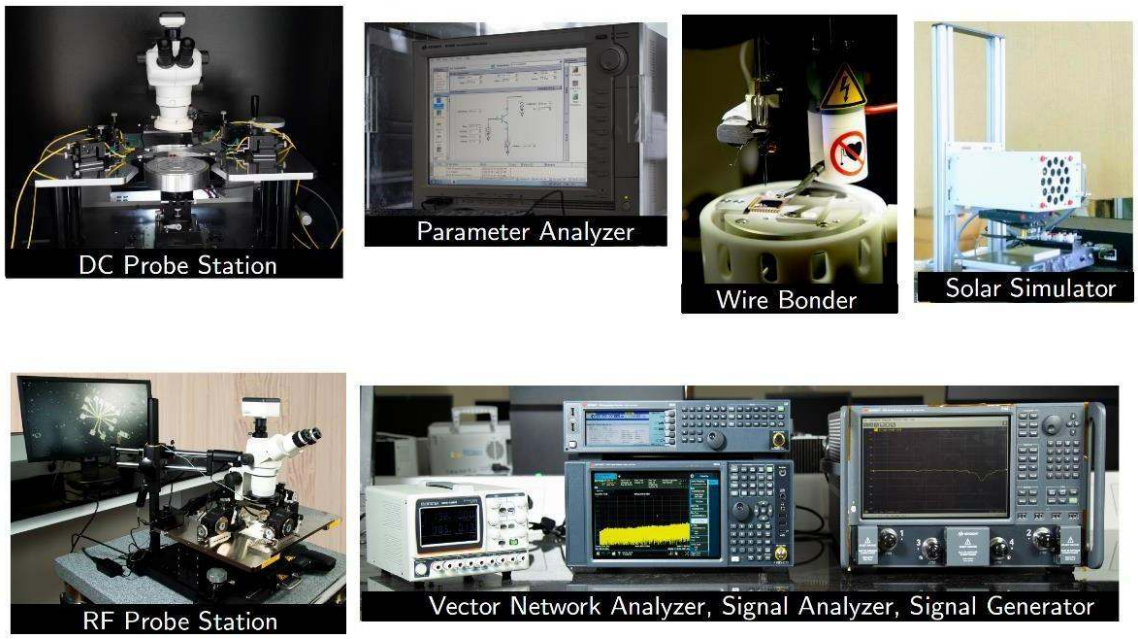
(Power Electronics Lab, Left: IGBT based Inverter Modules, DSO and Differential Probes, Right: Facility to Assembling and Test Various Machines)

Research Facilities

Laboratories / Research centres

Central Instrumentation Facility (CIF)

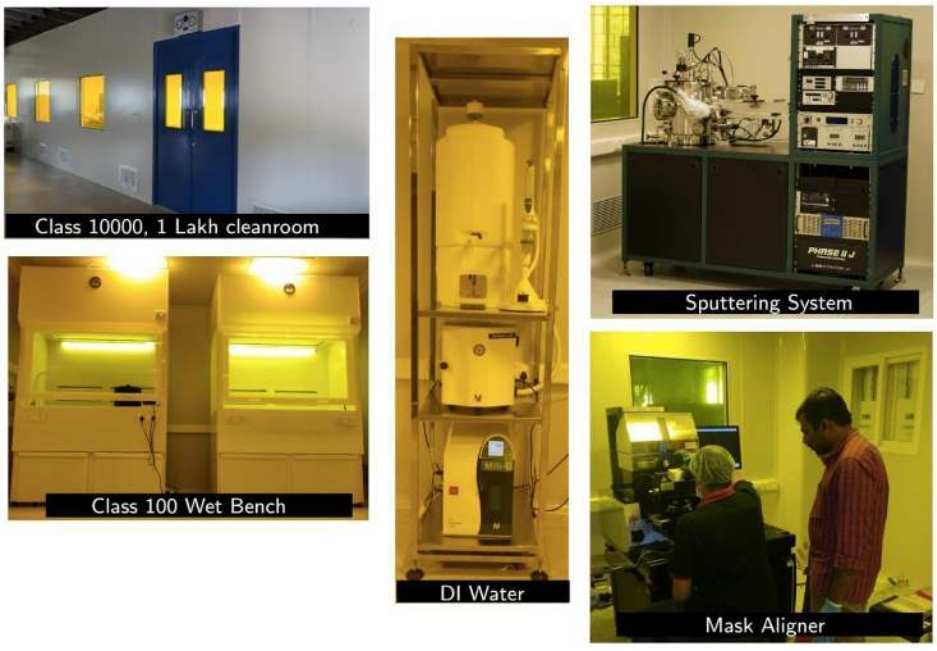
Electrical characterization facilities include DC probe station, RF probe station, parameter analyzer, wire bonder, vector network analyzer and signal analyzer, signal generator, solar simulator



CIF Electrical Characterization Facilities

Central Micro-Fabrication Facility (CMFF)

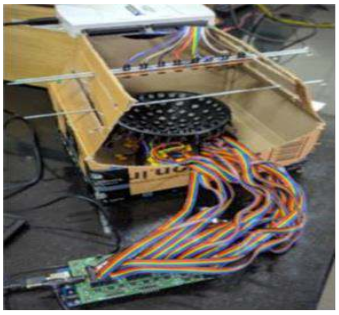
Facilities include class 10000 1 lakh cleanroom, class 100 wet bench, DI water, sputtering system and mask aligner



(CMFF Facilities)

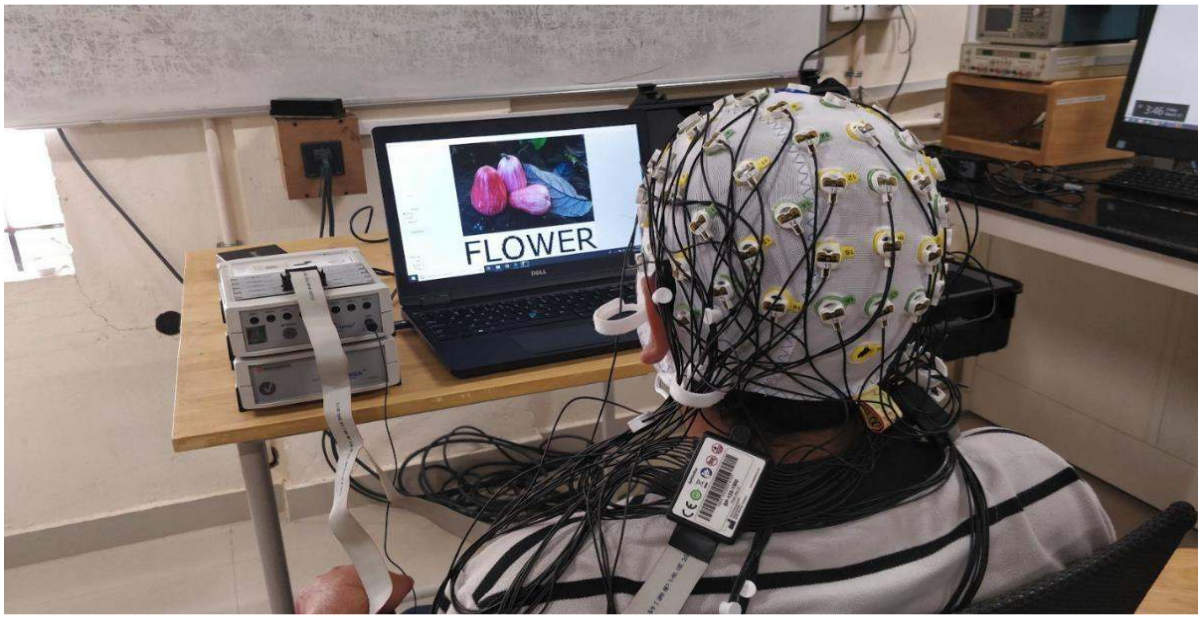
Centre for Computational Imaging (CCI)

Facilities include 128-channel research ultrasound system, 128 channel 5-10 MHz piezo electric linear array probe, 256 channel 5-25 MHz CMUT linear array probe, tissue mimicking Doppler phantom with average flow velocity of at least between 3-60 cm/s and with possibility of pulsatile and constant velocity flow, Vitus Siu-3 portable ultrasound system and 64 channel 40 kHz airborne ultrasound system and Maxim 2084 16 channel ultrasound transmitter/receiver analog front end.



Brain Machine Interface Systems Laboratory (BMISL)

Facilities include 64-channel Electroencephalograph (EEG) Amplifier, EMOTIV EPOC+ 14-channel Wireless EEG, Muse 4-channel EEG, Mobile Workstation Dell 3520



Microwave monolithic integrated circuits lab (MMICL)

Major highlights of MTech in Power Electronics & Power Systems

The vision in starting an MTech Program in Power Electronics and Power Systems is to ”Develop and maintain a high quality teaching and research environment in Power Systems, Power Electronics and Control and to emerge as a centre of excellence for contributing towards the society”. Power electronics is a key enabling technology and understanding of the diverse disciplines encompassed by power electronics - devices, converters, control theory and its application in the power system - is therefore essential to all power engineers.

The primary objectives of the M.Tech. program in Power Systems and Power Electronics are to train the students with adequate domain knowledge and skill-set in Power Systems and Power Electronics and to prepare them for the following career options:

- Research programs (higher studies) in Power Electronics / Power Systems/ Renewable Energy Systems and related areas
- In design and development with major international companies or government agencies

- Obtain consultancy posts with leading contract consultant companies
- Employment in R & D organisations related to sustainable technologies
- Power electronic circuit design and fabrication industries
- Reputed companies who provide software and hardware solutions to the utilities
- Academic careers

Key learning outcomes

- Competent users of relevant equipments and software used for research as well as industrial design
- Develop problem-solving skills
- Develop the ability to think logically and critically
- Develop a thorough understanding of current practices and its limitations and appreciation of likely new developments in the field of power electronics and power system engineering.
- Develop an appreciation for the challenges related to power electronics, power system, its control and realization
- Participate in collaborative-multidisciplinary engineering / research tasks and work as a team member in such tasks related to Power system domain, giving due consideration to ecological and economical intricacies, and lead the team in specific areas
- Responsible professional with intellectual integrity, code of conduct and ethics of research and serve towards the sustainable development of the society

8.7. Environmental Sciences and Sustainable Engineering Centre (ESSENCE)

Major themes

Vision

Bring science, technology, and policymaking together to develop and demonstrate
sustainable solutions for pressing socio-enviro-technical problems.

Mission

1. Develop sustainable technologies and innovations using locally available resources in the areas of energy, water, food, agriculture, ecology, waste management, and pollution mitigation.
2. Evaluate the nature of technology and its social/environmental impacts concerning the human modification of the natural world.
3. Build and deploy computational resources to assess the impact of scaling up or developing new technologies on the three dimensions (economic, social, and environmental) of sustainability to appraise policy.
4. Facilitate skill development and entrepreneurship to aid the deployment and scaling up of sustainable technologies.
5. Collaborate with local communities to integrate and help sustain indigenous knowledge practices through language maintenance and revitalization.
6. Become a credible nodal centre for exchanging scientific ideas, research, and innovation and evaluating the impact of deploying sustainable technologies at the local, regional, and national levels.

The Faculty

Dr. Athira P.	Dr. Dinesh Jagadeesan	Dr. P Gangadharan	Dr. Sunitha Nayar
Dr. Arun Rahul S	Dr. Divya P.V.	Dr. M Sabarimalai Manikandan	Dr. Veena Venudharan
Dr. Deepak Jaiswal	Dr. Mintu Porel	Dr. Sarmistha Singh	Dr. R Venkataraghavan

Resource Available

All the central facilities, such as SATCARD, CIF & CMFF, and HPC, are available for conducting research. Additionally, ESSENCE houses instruments for measuring leaf gas exchange rates and air quality.

Air quality measurement station

Portable Leaf gas exchange measurement

Academic Program

ESSENCE currently offers Ph.D./M.S. (by Research) programs.

Website:

For further information, please visit https://essence.iitpkd.ac.in/

8.8. Humanities and Social Sciences

The Faculty

Primary Affiliation

Dr Amrita Roy, PhD (Jawaharlal Nehru University)

Dr Anoop George, PhD (IIT Bombay)

Dr Reenu Punnoose, PhD (Newcastle University, U.K)

Dr Rahul Choragudi, PhD (Tata Institute of Social Sciences, Mumbai)

Dr Sujatha G, PhD (University of Madras)

Dr Sudarshan R Kottai, PhD (IIT Hyderabad)

Secondary Affiliation

Dr. Senthilkumar V, PhD (IIT, Madras)

The Department of Humanities and Social Sciences (HSS) at IIT Palakkad comprises a team of six faculty members who work on diverse research areas in Philosophy, Economics, English Studies, Linguistics, Psychology and Sociology. Currently, there are eleven research scholars enrolled in our PhD program. We offer a range of elective courses for undergraduate and postgraduate engineering and science students and PhD-level courses for 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 include introductory level and advanced level courses (research courses) in the subject areas represented in the department. In addition, we also offer courses 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.

8.9. Mathematics

The Faculty

Dr. Arpan Kabiraj, PhD (IISc, Bangalore)

Dr. M. Ashok Kumar, PhD (IISc, Bangalore)

Dr. G. P. Balakumar, PhD (IISc, Bangalore)

Dr. Gopikrishnan C. Remesan, PhD (IIT Bombay - Monash Research Academy)

Dr. Jaikrishnan Janardhanan, PhD (IISc, Bangalore)

Dr. C. R. Jayanarayanan, PhD (ISI, Bangalore)

Dr. Lakshmi Sankar K, PhD (Mississippi State University, USA)

Dr. Parangama Sarkar, PhD (IIT Bombay)

Dr. Rohith Varma, PhD (Chennai Mathematical Institute, Chennai)

Dr. Sarath Sasi, PhD (Mississippi State University, USA)

Prof. Varadharajan Muruganandam, PhD (IIT Kanpur)

The Department of Mathematics

The Department of Mathematics at IIT Palakkad is strongly committed to excellence in research and teaching. The fields of research of the faculty members include Algebraic Geometry, Commutative Algebra, Differential Equations, Functional Analysis, Harmonic Analysis, Several Complex Variables, Topology, Numerical Analysis and Mathematical Biology, Computational Fluid Dynamics, Mathematical Statistics, Probability, and Information Theory. We envision to have a fast and steady growth leading to a strong and diverse Mathematics community at IIT Palakkad. The PhD program of the department was started in 2017. There are currently 15 Ph.D students working in the department. The MSc (Mathematics) program was started in 2020. There are 20 and 17 students in the first year and second year respectively.

The MSc Program

The MSc Mathematics program envisions to train the students to pursue careers in both academia and industry. Besides providing a firm mathematical foundation, the curriculum also provides excellent opportunities for the students to gain exposure to and specialise in pure/applied mathematics, data science, theoretical computer science among many other allied subjects.

The curriculum offers 12 core courses and 7 elective courses, the latter to be selected from a vast number of options which are being constantly upgraded keeping pace with the challenging developments in research and ever demanding requirements of the industry. Another attractive feature of this program is that the students have an opportunity to do a project in lieu of some elective courses to acquire a wider knowledge and hand-on experience in a specific area.

The department strives to have a vibrant academic ambience through several academic initiatives like long-term and short-term visitors and student seminars. Apart from preparing students for academic pursuits, the Institute also has a placement cell to facilitate industry opportunities. There are 22 and 18 students in the first year and second year respectively.

8.10. Mechanical Engineering

The Faculty

Prof. A. Seshadri Sekhar, PhD (IIT Madras)

Prof. T. Sundararajan, PhD (University of Pennsylvania, USA)

Dr. Afzaal Ahmed, PhD (NUS, Singapore)

Prof. Anand TNC, PhD (IISc, Bangalore)

Dr. Anoop Akkoorath Mana (IISc, Bangalore)

Dr. Arijit Hazra, PhD (Max-Planck Institute of Multidisciplinary Sciences)

Dr. Buchibabu Vicharapu (IIT Bombay)

Dr. D. Chakradhar, PhD (NIT, Warangal)

Dr. D. Kesavan, PhD (IIT Madras)

Dr. Dinesh Setti, PhD (IIT Delhi)

Dr. Ganesh Natarajan, PhD (IISc, Bangalore)

Dr. Kanmani Subbu S., PhD (IIT Kanpur)

Dr. Krishna Sesha Giri, PhD (IISc, Bangalore)

Dr. K. V. N. Surendra, PhD (IISc Bangalore)

Dr. Nelson Muthu PhD (IIT Bombay & Monash University)

Dr. Pramod Kuntikana, PhD (IIT Bombay)

Dr. Samarjeet Chanda, PhD (IIT Madras)

Dr. Santhakumar Mohan, PhD (IIT Madras)

Prof. Sovan Lal Das, PhD (Cornell University, USA)

Dr. Vineed Narayanan, PhD (IIT Madras)

The Department of Mechanical Engineering offers a four-year undergraduate BTech Program; two-year Master's program and research (MS and PhD) programs. The undergraduate curriculum mainly integrates fundamentals of mechanical sciences & engineering along with electives concerning allied and general topics including professional ethics. MTech 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 streams – 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 design carry out research related to fracture mechanics, vibrations, robotics and bio-physics. Among the research areas in the manufacturing

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 modeling, studies of battery thermal management systems, modeling 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.

There are research level laboratories in Thermo-fluids, Solid Mechanics and Design and Manufacturing and Materials streams. The details are mentioned below:

Thermo-fluids Engineering

Current Focus Areas

- Combustion studies through experimental and numerical techniques
- Major focus areas include soot modeling, gas turbine combustion, optical diagnostics in combustion etc.
- Design and development of battery thermal management system
- Development of novel computational frameworks for fluid flows both in the compressible and incompressible regimes
- Thermal contact conductance measurements of spacecraft joints
- Devising immersed boundary/finite volume frameworks and its application to multi-physics problems
- Mathematical modeling in sports
- Studies on thermal transport properties of packed and powder beds
- Heat transfer studies in additive manufacturing (powder bed fusion)
- Jet impingement and film cooling
- Passively cooled building design
- Thermal energy storage (Brayton battery)

Available Equipment

- Environmental Chamber
- Thermo-vacuum chamber

- Ultra-low temperature thermal circulator
- Thermal circulator cum chiller (three units)
- Infrared camera
- Direct Current Power Sources
- Battery test system
- Hydraulic loading arrangement
- Load cell setup
- Data acquisition System (two units)
- Dual pulse laser (15 Hz)
- Single-pulse Nd: YAG with dye laser
- Dual frame CCD camera with intensifier
- Monochromator with Photomultiplier tube and DaVis software
- Air compressor and receiver
- Chandra High performance computing cluster (HPC-central facility)

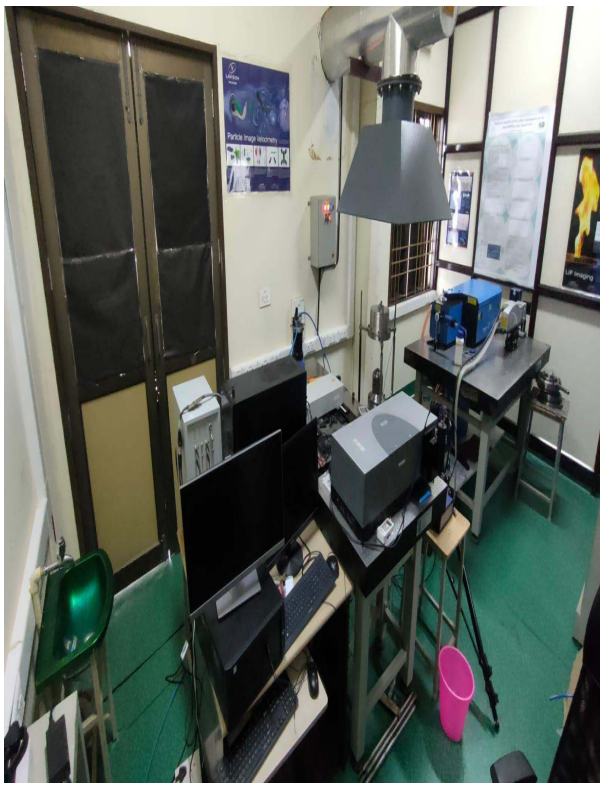


Fig: Laser diagnostic setup with fume hood

Fig: Opposed jet flame burner

Fig: Mass Flow controllers and data acquisition system

Fig: Temperature calibrator, Thermal environmental chamber

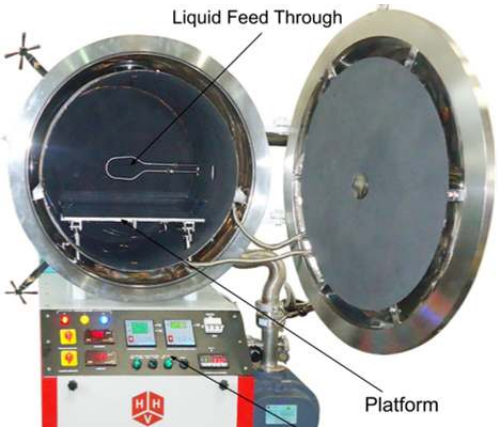


Fig: Thermo-vacuum chamber

Solid Mechanics and Machine Design Engineering

Current Focus Areas

- Understanding the noise generation from vibrating structural members (structural acoustics).
- Stress analysis of certain uncracked 2-D solids & fracture analysis of cracked versions of the same solids, within linear elasticity & LEFM.
- Design and development of a new sitting-type lower limb rehabilitation robot.

- Robotics and automation in Agriculture.
- Design and development of an intelligent Underwater Vehicle with a Manipulator for offshore oil/gas and other marine applications.
- Adhesion and contact mechanics of soft and thin structures.
- Flow of granular media
- Jamming and stress transmission in granular media.

MTech in Manufacturing and Materials Engineering

The major objective of this MTech program is to prepare graduate students to face challenges posed by research and industries involved in manufacturing and materials. In addition, this program focuses on improving research skills of the students, and develops a passion for doctoral programs. This program offers core courses like Advanced Engineering Materials, Advanced Manufacturing Processes, Mechanics of Machining, Computer Integrated Manufacturing, Mechanical Behaviour of Materials and Computer Aided Metrology. Further, electives prescribed in the curriculum provide specialised knowledge in the area of the individual interest. For the first two semesters, students are required to do a substantial amount of coursework. In subsequent third and fourth semesters students will be working on the projects.

In addition to this, for conducting advanced research in manufacturing and materials engineering, 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), Central Micro Fabrication Facility (CMFF) and Central Facility for Materials and Manufacturing (CFMM) Engineering. As a part of the central facilities, sophisticated instruments which are relevant to the field of materials engineering such as Scanning Electron Microscope, X-ray diffractometer, hardness tester and a surface profiler for analysis and characterization of samples are already set for use. Other central facilities in Materials and manufacturing are equipped with 3D metal printing (Laser based Powder Bed Fusion) technology , micromachining centre, Die sink EDM, etc. Further details of the available central facilities at IIT Palakkad can be seen at https://cif.iitpkd.ac.in/ and

https://iitpkd.ac.in/central-facility-materials-and-manufacturing-engineering

8.11. Physics

The Faculty

Dr. Akshay Bhatnagar, PhD (IISc, Bangalore)

Dr. Amit Kumar Pal, PhD (Bose Institute, Kolkata)

Dr. Bibhu Ranjan Sarangi, PhD (RRI, Bangalore)

Dr. Jayakumar Balakrishnan, PhD (National University of Singapore)

Dr. Kusum Dhochak, PhD (TIFR, Mumbai)

Dr. Prithvi Narayan P, PhD (TIFR, Mumbai)

Dr. Projjwal Banerjee, PhD (University of Minnesota, Minneapolis, USA)

Dr. Soham Manni, PhD (Georg-August-Universitat Gottingen Germany)

Dr. Uma Divakaran, PhD (IIT Kanpur)

Dr. Vishwas V, PhD (JNCASR Bangalore)

Dr. Moumita Nandi, PhD (SINP Kolkata), Inspire Faculty

Dr. Mayarani M, PhD (IIT Madras), Inspire Faculty

Dr. Swaroop Sahoo, PhD (Colorado State University, USA)

Dr. Debarati Chatterjee, PhD (IISc, Bangalore)

Prof. Seshadri Sridhar, PhD (IISc, Bangalore), Adjunct Professor

Overview

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 , 2 Inspire Faculty, and 1 Post-Doctoral Researcher in the Department, engaged in various research projects in several topical and multidisciplinary topics covering the following areas:

1. Astrophysics
2. Experimental Biophysics
3. Experimental Condensed Matter Physics
4. High Energy Physics and String Theory
5. Statistical Physics
6. Soft-Matter Physics
7. Many-Body Physics
8. Quantum Information Theory and Quantum Computation
9. Non-Equilibrium Dynamics and Quantum Phase Transitions

In July 2017, the Department started its dedicated PhD program, and at present a total of 19 students are pursuing research in these exciting fields. Besides its thriving research activities, the Department also runs a two year MSc program in Physics, and supports in training young Engineering undergraduate students in basic sciences.

MSc Program in Physics

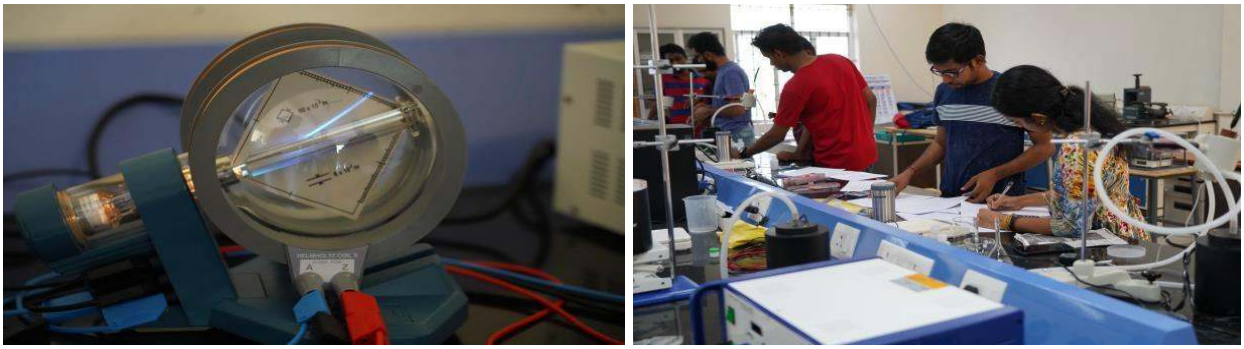
Kick-starting from July 2019, the two years (four semesters) MSc program in Physics is now open to students with Bachelor's degree in basic sciences with Physics as a subject for at least 2 years / 4 semesters, and Mathematics for at least 1 year / 2 semesters. The selection process is based on the national level "Joint Admission Test for MSc" (JAM) conducted by the IITs. The four semester program has core-theory courses in the first two semesters emphasising the fundamentals of the subject, and laboratory courses which allow the students to explore and familiarise themselves with classic experiments in the field. In the third and fourth semester, the students

will get an opportunity to explore advanced electives (theory) and laboratory courses, which are in the forefront of research, along with a yearlong project guided by faculty members experienced in the respective field. The elective courses and the projects offered by the Faculty are at par with the current worldwide trends in research and industry. The course structure has been formulated to enable students to pursue research in leading national and international universities and research institutions, as well as to explore jobs in research and development sectors.

Experimental Facilities

The Department has at present a teaching Physics laboratory to cater the needs of undergraduate/graduate students and is equipped with experimental setups that can boast of the latest technology. The M.Sc. Physics laboratories are categorised by different themes, namely, Mechanics, Electromagnetism, Thermal Physics, Atomic Physics and Spectroscopy, and Electronics and Instrumentation. The M.Sc. Physics laboratory houses state of the art experimental setups such as Eddy Current Pendulum, Thomson Tube, Michelson Interferometer, Nuclear Magnetic Resonance (NMR) Spectrometer, Electron Spin Resonance (ESR) Spectrometer, Liquid Nitrogen Cryostat, Scanning Tunneling Microscope, Epifluorescence microscope and Polarizing Microscope. Currently there are three technical staff in the Physics laboratory to manage experimental setups and assist students in experiments.

In addition to this, for conducting advanced research IIT Palakkad has set-up different central facilities namely Chandra High Performance Computing Cluster, Central Instrumentation Facility (CIF) and Central Micro Fabrication Facility (CMFF). Other Central facilities in Materials and Manufacturing, and Data Mining will be operational soon. Details of the available central facilities at IIT Palakkad are listed in section "**Central Research Facilities at IIT Palakkad**".



UG/ PG Lab of the discipline of Physics

9. OTHER FACILITIES

9.1. Institute Library

As the informatics centre of the Institute, the Central Library provides an enjoyable learning experience with a carefully developed collection of books, journals, standards, magazines, newspapers, and a wide range of online resources. The library also stores collections of audio-visual materials such as CD-ROMs, scientific kits, etc. The library opened its doors to students, faculty, and staff in August 2015 with a collection of 700 printed books (textbooks, references, popular sciences, and literature), which has grown to more than 7700+, and a number of e-books have also been added in the past nine years. Based on the requirements of researchers, the library has subscribed to about 8200+ e-resources for its users. The library also has the support of the national consortium E-Shodh Sindhu (INFLIBNET) to fulfil the maximum journal requirements. The operations of the library are fully computerised and enabled by the RFID system to ensure fast and secure circulation activities. The RFID-based kiosk provides self-check-in and self-check-out of books. The library is under a 24x7 CCTV surveillance system for security. The library is also equipped with Wi-Fi and a LAN facility for unlimited high-speed internet access. Online facilities of the library are available 24x7x365 days for its registered users. Users can renew and reserve books through the Online Public Access Catalog (OPAC) at any time and from anywhere. The library also renders services such as reference and consultation, as well as updating users with current awareness services. The users of the Central Library of IIT Palakkad are also registered with the National Digital Library, sponsored by the Ministry of Education (MoE) and coordinated by IIT Kharagpur. To learn more about

your library, please visit https://lib.iitpkd.ac.in/.

9.2. High Performance Computing Cluster (HPC)

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:

1. Understanding and designing materials with novel physical properties by performing atomistic quantum mechanical simulations.
2. Design of nanoscale transistors for next generation electronic applications.
3. Design of novel bio-molecules with applications in medicine.
4. Design of large structures such as bridges and buildings.
5. Performing computational fluid dynamic simulations.
6. Understanding the process of heat transfer in complex systems such as engines.
7. Solving non-equilibrium dynamics in quantum Hamiltonians.
8. Understanding mechanical properties of disordered solids and equilibrium properties of metastable liquids.
9. Computational studies on the transition metal catalyzed reactions.

9.3. Central Instrumentation Facility (CIF) and Central Micro-Nano Fabrication Facility (CMFF)

Materials are the backbone of technological advancement. Often new technology is driven by design and discovery of new materials. To unfold the potential of new materials one has to investigate all its physical and chemical properties which may lead to fabrication of new devices using it. One of the thrust areas of research in IIT Palakkad is to develop new functional molecules and materials; fabricate nano-scale machines using them. In 2019, 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. In 2021, a material synthesis unit (MSP) was established in Nila Campus under CIF.

Functionally, the facility is grouped under the themes of Synthesis, Characterization and Fabrication.

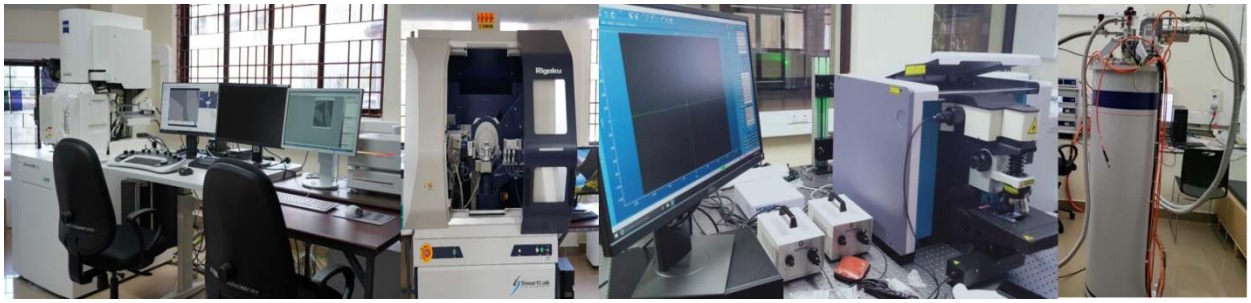
CIF (Synthesis) – Materials Synthesis and Processing (MSP) Lab

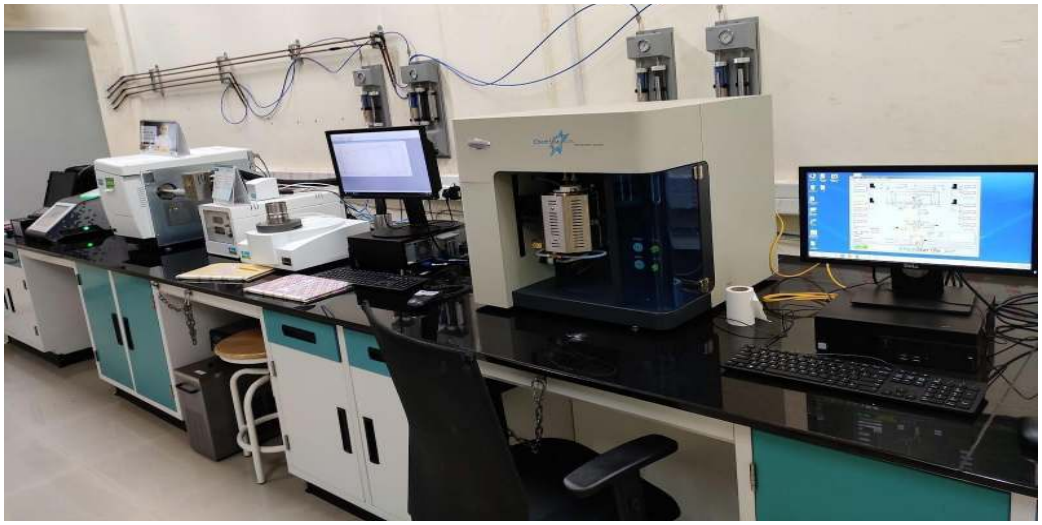
The objective of this unit is to support the materials research by pooling in equipment meant for physical and chemical synthesis of materials at non ambient conditions e.g. high temperature (up to 1800^{o}C), under high vacuum or different gas environment (O_2, Argon, N_2 and reduced atmosphere) and under high mechanical energy. Different kinds of high temperature furnaces, ball milling, quartz tube sealing stations are installed in this facility. The unit started operating from Nila Campus in January, 2021. The facility is equipped to synthesize a wide variety of oxide, metallic, intermetallic compounds in single and polycrystalline form for different kinds of applied and basic research.

The equipment installed in the unit are listed below:

- High Temperature Chamber furnace with Programmable PID temperature Controller. (Tmax = 1700 ºC)
- Mono Arc Melting Furnace.
- Ball Mill
- Rapid Thermal Processing Unit (Gas flow furnace, T_{max} = 1100ºC)
- Muffle furnace (T_{max} = 1000ºC)
- Quartz Tube Sealing Station

CIF (Characterization)





Different sophisticated equipment installed in the CIF (Characterization) unit facilitates chemical, structural and electrical characterization of the samples. This facility houses several characterization techniques to investigate complex mixtures of molecules produced during chemical reactions, bulk materials in single and polycrystalline form as well as in thin film form. A wide range of features also provides scope for conducting many interesting in situ and kinetic experiments.

Structural information of materials such as crystallinity, microstructure, surface morphology, roughness for powder and thin film samples upto 1500ºC can be analysed using X-ray diffraction. For microscopy, the facility houses a state of the art High Resolution-Field Emission Scanning Electron Microscope (HR FEG - SEM) which can perform standard imaging, backscatter diffraction (EBSD) for studying the texture in single and poly-crystalline materials and energy dispersive x-ray spectroscopy (EDS) for studying chemical composition. E-beam lithography for fabricating micro-level devices for electronics/communications applications can be performed at high precision using the SEM. The facility has inducted a confocal optical microscope to study materials and biological samples under visible wavelength. For chemical characterization of materials different spectroscopic techniques at different wavelength ranges are housed in this facility e.g. NMR, Raman Spectrometer, FTIR, Mass Spectrometer etc. For studying thermal stability of the materials and reactions happening in the material a Thermogravimetric Analyzer is installed in this facility which is coupled with a Mass Spectrophotometer.

One of the necessary arms of device/material characterisation is electrical characterisation. This is essential to determine the electronic behaviour of diverse samples across multiple disciplines. To this end, we have the facilities to perform electrical characterization from low to high frequencies. CIF has a DC probe station and the semiconductor parameter analyser (SPA), using which high-precision measurement of different electrical characteristics (such as, current-voltage, capacitance-voltage, current-time, capacitance-time) at low frequencies, is possible. High-frequency measurements are possible using the RF probe station, vector network analyzer (VNA), RF signal analyzer, and RF signal generator. High-frequency signals can also be observed in time-domain on an ultrafast oscilloscope. Recently the facility has inducted a closed cycle cryostat to measure electrical properties down to 300 mK temperature under 12 Tesla magnetic fields.

The equipment installed in the unit are listed below:

- Fourier Transformed IR Spectrophotometer
- Automated flow Chemisorption
- Semiconductor Parameter Analyser
- Manual DC Probe Station
- Manual RF Probe Station
- Vector Network Analyzer
- Signal Analyzer
- Gas Chromatograph
- Analog Microwave Signal Generator
- Thermogravimetric Analyzer coupled with Mass Spectrometer (TG-DTA-MS)
- High Performance Liquid Chromatography
- Liquid Chromatography Mass Spectroscopy
- Nuclear Magnetic Resonance Spectrometer
- Non-Contact Optical Profilometry
- Universal Hardness Tester
- Raman spectrophotometer
- Scanning Electron Microscopy (SEM) with EDS, EBSD and Lithography attachment
- X-ray Powder/Thin film Diffraction (XRD)
- Wire Bonder
- Mixed signal digital storage oscilloscope
- 64-channel Electroencephalograph (EEG) Data Acquisition System.
- Nuclear Magnetic Resonance Spectrometer
- Semiconductor device analyzerVTI
- PCB prototyping machine with PTH facility
- Confocal Microscope

CIF (Fabrication): Central Micro-Nano Fabrication Facility (CMFF)

The Central Micro-Nano Fabrication Facility has class 100000 and class 10000 cleanrooms, well-equipped for fabrication of devices. The cleanroom houses 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. Realisation 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 areas including (but not limited to): (i) Design, fabrication and characterisation of 2D spin devices (including GMR devices), heterostructures of 2D materials and perovskites; (ii) Design, fabrication and characterisation of CMOS-compatible photodetectors; (iii) Fabrication and characterisation 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 characterisation of GaN- based mm wave devices and circuits; (vi) Fabrication and characterization of Perovskite solar cells.

The equipment installed in the unit are listed below:

- Mask Aligner
- Polypropylene Fume Hoods
- De-Ionized Water Plant
- RF/DC/Pulsed DC Sputtering System
- Spin Coater
- Optical Microscope
- Three-port glove box
- Critical point dryer (CPD)

9.4. Career Development Center (CDC)

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.

IIT Palakkad witnessed a perfect culmination of the campus placement year after year in which several offers were received from coveted MNC's with excellent profiles, as desired by the students. The CDC at IIT Palakkad dominated the peer IITs on account of the highest percentage of job offers received by students. In addition to these, several PSUs visit the campus for recruitment each year.

The statistics given below give a quick glimpse of the campus placement

Batch	2019-2020	2020-2021	2021-2022	2022-2023
Batch Size	106	163	251	293
No. of students registered in the CDC portal for placement	82	115	193	211
No. of offers	87	120	208	206
No. of students placed	74	97	176	190

No. of Companies participated in the campus process	70	110	215	158
Placement percentage (based on No. of Students Placed)	90	84.34	91.19	90.05
No. of PPO's (pre-placement offers)	15	6	26	38
Average CTC INR (in Lakhs)	9.93	11.42	13.93	13.95
Salary range INR (in lakhs) per annum	5.04 - 21.3	3.3 - 31.59	3.6 to 120	6.0 - 46.15

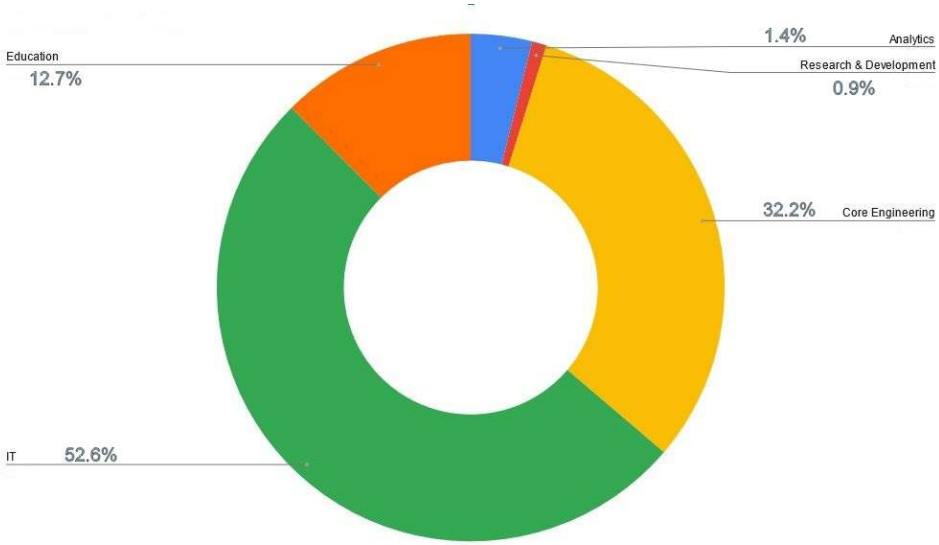
Key Placement Highlights (2022-23)

- 36 Pre-Placement offers. This is the highest on-campus PPO thus far at IIT Palakkad
- Highest CTC of INR 46.15 lakh
- The average CTC is 15.65 LPA
- ICICI Bank has offered the maximum number of offers which is 20
- Sprinkler offered a stipend 2 lakh per month for 2 CSE students

Some notable companies which offered employment and internship are Sprinklr, MathWorks, Texas Instruments, Arista Networks, Strand Life Sciences, Perceptive Analytics, Adobe, GE Healthcare, Accenture Japan, Achnet Inc, AirAsia, Apex Plus Technologies, Byjus, C-DOT, Ceremorphic Technologies Pvt. Ltd., Colortokens, GE Digital, Globallogic, HCL Technologies, ICICI, Ingram Micro, Innoplexus, ITS Planners, Jio, Kantar, L&T, Larsen & Toubro Infotech Ltd, Legato Health Technologies, LTI Spark, MAQ Software, Maruti Suzuki, MediaTek, Mercedes Benz, Nation with Namo, Ninjacart, Paytm, Perpetual Blocks, Quantile Analytics, Salesforce, SEDEMAC Mechatronics, Solutionec, Target Corporation, Tata Autocomp Systems, Technoforte, Vantage Research, Vehant Technologies, Versa Networks, Wabtec, William O'Neil etc.

The centre is functional under a Professor's In-Charge and the Training and Placement officer (TPO) is dedicated to grooming the students.

Placements Across Industry Sector (2022-2023):



9.5. International and Alumni Relations (IAR)

The Office of International and Alumni Relations at IIT Palakkad is responsible for International collaboration, International Admissions and Alumni related Activities

The activities of the Office of International Relations are

1. Initiating faculty collaboration and MoU partners with foreign institutions
2. Student mobility programs, research internships, study abroad programs and project work
3. Joint Research programs and Joint Doctoral programs
4. Promoting IIT Palakkad's programs for the International community in the different regions
5. Direct admission to Master's and PhD programs for deserving foreign students
6. Admission through the different Association of Southeast Asian Nations(ASEAN), Study in India (SII), Indian Council for Cultural Relations (ICCR), Embassy and other avenues and
7. Hosting Delegations from Foreign universities and Embassy.

The activities of the Office of Alumni relations and resources:

1. Maintaining the Alumni database

2. Coordinating with alumni, sending greetings
3. Celebrate alumni successes by keeping track of news
4. To conduct chapter meetings in various cities in India and in global locations
5. A half-yearly newsletter
6. Mentoring support by alumni
7. Internships and vacancies portal as part of the ARO website
8. PG centric campus events.
9. Batch-wise reunion day
10. Separate PG reunions with department involvement

9.6. TECHIN and CSquare Innovation

Technology Innovation Foundation of IIT Palakkad (TECHIN), a section 8 (not for profit) company set up as an Incubator arm of IIT Palakkad. TECHIN is a collaborative entity with Institutes and Industry to create an impactful innovation ecosystem, discover disruptive technologies and enable entrepreneurs & startups. Multiple centres of excellence exist and are emerging under this company. The Sanitech, with focus on water sanitation and hygiene, The MedTech Research centre of Excellence (MedTechCOE) focused on biomedical devices and Med Tech interventions. A Technology Innovation centre (TIC) which takes care of all the training, innovation and incubation needs for the startups across domains. TIC also incubates startups in other domains including Intelligent Collaborative Systems in safety and energy for which innovation and funding come from IIT Palakkad Technology iHUB Foundation, a sister company.

TECHIN conducts pitch events, workshops on entrepreneurship, and hackathons. Teams are selected for pre-incubation, incubation or acceleration depending on their stage of growth. The ideas that are selected include domains in sanitation, medical technological devices, smart mobility, Intelligent collaborative systems. The ideas selected thus far had relevance to current challenges in the world including medical technology (prosthetic devices, connected devices, service for care), sanitation (toilet, disinfectant devices and solutions, treatment systems, cleaning systems), drones in agriculture, drones for safety in construction, plastic and waste recycling, etc.

Technical and business mentoring from customer discovery and value proposition, access to rapid prototyping and testing facilities, access to incubation space, access to field sites for testing, support for legal, financial, patent, Go to market strategy development, innovation grant and access to further funding.

GSCOE team with Mr Bill Gates and Prof Ajay Sood, PSA GoI

Incubatees presenting at the Industry conclave

Incubation space during demo day

CSquare Innovation Centre

IIT Palakkad has put in place a strong ecosystem to encourage innovation and entrepreneurship activities among the students, staff and faculty. The Csquare Innovation Centre is a well-equipped facility for the fabrication of any prototype, proof-of-concept designs or project work in soft and hard materials in any interdisciplinary field. Facilities include: 3D printers, CNC Laser cutter, CNC Milling

Machine, CNC Router, 3D Scanner, CNC Lathe, Power Hacksaw, Planner, Band Saw, Table saw, Plasma cutter and several hand tools. Software required like Fusion 360 are also available. Several new facilities for PCB fabrication, component assembly, reflow soldering, electronic workbenches and welding are in the process of being set up. Students are encouraged to develop new products and initiate startup activities. In addition, the Centre provides infrastructure for various courses and student-run technical clubs to conduct their activities. Several invited talks, workshops and short-term courses on innovation and entrepreneurship are conducted.

10. HOSTELS AND STUDENT WELLNESS

Hostels

IIT Palakkad houses six hostels: four in the tranquil Nila Campus and two in the serene Sahyadri Campus. Students are provided with double/triple sharing accommodation in Nila Campus, while rooms at Sahyadri Campus are either single or triple occupancy rooms.

Our hostels are equipped with well-appointed rooms, water heaters, RO-based drinking water systems, heavy-duty washing machines, and both WiFi and LAN network connections, ensuring convenience and connectivity. Additionally, a spacious dining hall, a well-equipped recreational area, an indoor games area, and a fitness centre are readily available for leisure and physical activities. Each room is equipped with either WiFi or LAN connectivity, offering seamless online access. Additionally, common rooms in every hostel provide a space for relaxation, equipped with a television, newspapers, and a selection of magazines chosen by the student body.

Student wellness

Anti-ragging measures

The motto of the Institute is zero tolerance to ragging. The students and parents are sensitised 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.

Counselling Services

A professional counselling service (Mitra) 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 three counsellors (2 Female & 1 Male) who are experienced Clinical Psychologists, are available to the students all the time. Apart from this,YourDost- the online counselling services are also made available to the students. There are trained student volunteers on campus to provide peer support as well.

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

IIT Palakkad has an outpatient clinic with a medical officer, staff nurse and 24 hours ambulance services. The students are covered by a comprehensive medical insurance scheme for a nominal yearly subscription. IIT Palakkad has MOUs with Ahalia Diabetes Hospital, Athani Hospital, Malabar Hospital, Manomitra, Avitis, Palakkad Institute of Medical Sciences, Lakshmi Hospital, Trinity Eye Hospital and Thangam Hospital for cashless medical attention. Students can also go to the hospitals of the Ahalia Foundation for treatment as outpatients. Institute Clinic is operational in the Nila campus.

Sports facilities

IIT Palakkad is continuously improving its sports and games facilities. Good facilities exist for football, volleyball, basketball, table tennis, badminton and cricket. There is a resident Physical Training Instructor in the campus, who trains students in different games, physical fitness, weight lifting, etc. and takes care of the Institute gym. Other coaches are hired as and when needed.

11. The Student Affairs Council (SAC)

The SAC of IIT Palakkad, established in 2016, is the supreme student-body council which takes all the pivotal decisions, in association with the institute, and suggests policies whenever necessitated, concerning the welfare of the whole of the student community of IIT Palakkad. The SAC, headed by the Student General Secretary, consists of eight student-elected representatives who passionately work together towards transcending the institute in a plethora of fields and enhancing the student life at the institute. With the aforementioned view, SAC consistently promotes the objectives of fostering curricular, co-curricular and extracurricular activities for the holistic development of the students of IIT Palakkad. SAC is an indispensable part of our institute and has been instrumental to the growth and development of the institute since its inception.