



Information Brochure

M.Tech. **POWER SYSTEMS MANAGEMENT**

**DEPARTMENT OF ELECTRICAL
ENGINEERING**

(Led by Power Management Research Group
www.pmresearch.in)



MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

J.L.N. Marg, Jaipur-302 017 INDIA

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PROGRAMME DETAILS AND ADMISSIONS

Programme Description

In view of the current restructuring of electricity supply systems, evolution of electricity markets and smart grid systems, traditional Power System engineers need to be oriented towards the industry need, making them capable of dealing with multi-disciplinary nature of evolving industry problems. Considering this challenge, Department of Electrical Engineering, MNIT Jaipur offers a unique programme leading to the award of M.Tech. Degree in Electrical Engineering (Power Systems Management). The programme offers learning in Power System Operation and Control, Power Markets, Regulation and Policies, Economics and Electricity Trading, Smart Grids, Optimization, and Management of Renewable Generation.

Aims and Objectives

- Impart knowledge on electrical power system operation, planning and smart grid systems.
- Impart knowledge and industry-oriented skills of document preparation and scenario analysis for decision making in the rapidly evolving electricity and energy supply industry.
- Develop graduates with a strong understanding of electricity markets, renewable integration, smart grid systems, planning, and data analytics.
- Imbibe knowledge of modern programming tools (C, C++, MATLAB, GAMS, PYTHON, PSS®E, TIMES, Artificial Intelligence, Machine Learning, R, Plexos etc.) for solving industry research challenges.
- Enhance managerial skills with a strong understanding on underlying economics and regulation.
- Develop a pool of trained scholars, professionals, officials, and consultants for the highest quality jobs in the exponentially growing industry segment.

Programme Highlights

- Industry supported classes to pick up quick industry skills: Fulfils the learning gaps from a purely academic delivery of courses.
- Industry internship after two semesters of course work, and placement after four semesters for the amply trained and highly employable graduates.
- Collaborative research with top international universities and industries: Enhances value in terms of knowledge and exposure.
- Industry internships on real industry challenges: Industry to benefit from deep research understanding of scholars.

Target Groups

- Students seeking advanced knowledge of Power System & Smart Grid Engineering
- Professionals from Power & Energy Utilities
- Government functionaries/ administrators
- Power System Operators
- Power System Planners
- Power System Regulators
- Public Sector Undertakings Officials
- Consultants & Researchers



PROGRAMME COURSES

Core

- Optimal Operation and Control of Power Systems
- Power System Restructuring and Deregulation
- Power Markets, Economics and System Operation
- Smart Energy Management Systems
- Seminar & Dissertation
- Distributed Energy Integration
- Machine Learning and Data Analytics
- Power System Analysis
- Energy Policy, Governance and Regulations
- Electric Power Project Evaluation and Pricing
- Power Systems Management Laboratory

Research Domains for Dissertations

- Power Systems Restructuring
- Generation System Operation/Planning
- Distribution Network Operation/Planning
- Transmission System Operation/Planning
- System Operation in Restructured Markets
- Power Systems Economics
- Electricity Markets
- Congestion Management
- Integration of Plug-in Electrical Vehicles
- Network Pricing
- Energy Policies
- Energy Storage
- Decision Making under Uncertainty
- Smart Grid
- Reactive Power Compensation
- Generation and Load forecasting
- Energy Planning and Management
- AI Applications to Power Systems
- Ancillary Services
- Energy and Ancillary Services Trading
- Virtual Energy Storage System
- Peer to Peer Energy Trading
- Risk Management
- Blockchain Technology
- Computational Intelligence
- Game Theory
- Intelligent Systems
- Machine Learning
- Cyber Security in Power System
- Energy Forecasting

Electives

- Flexible AC Transmission Systems
- Electricity Trading and Risk Management
- Power System Planning and Reliability
- Risk Assessment of Power Systems
- AI Application to Power Systems Management
- Modelling and Planning of Energy Systems
- Power Distribution Systems
- Sustainable Energy Sources
- Stochastic Systems, Optimization and Control
- Power System Analysis and Quality
- Computer Methods in Power Systems
- Service Quality Management
- Integrated Energy Systems
- Data Mining and Information Retrieval
- Grid Connectivity and Smart Grid
- Operational Research Methods and Project Economics

Admissions

Who can Apply :

B.Tech. / B.E. in any of the domains of

- Electrical Engineering
- Electrical Engineering (Power)
- Electrical Power Engineering
- Control & Electrical Engineering
- Electrical & Electronics Engineering
- Power Electronics
- Electrical Engineering & Industrial Control
- Electrical & Power Engineering
- Electronics & Electrical Engineering
- Electronics & Power Engineering
- Power Control & Drives
- Power Engineering
- Electrical & Electronics (Power Systems)

Course Duration & Seats

| COURSE | DURATION |
|-----------|----------|
| Full-Time | 2 Years |
| Part-Time | 3 Years |

Seat Details

| | |
|------------------------------|----|
| Full time with assistantship | 21 |
| Full time sponsored | 05 |
| Part time sponsored | 06 |

Industry - sponsored seats are available to support potential staff to attain M. Tech. degree in Power Systems Management.

PLACEMENT HISTORY

BATCH OF 2021

| | | |
|----------------------|---|--|
| 1. S. E. Reddy | - | L&T Technology Services Limited |
| 2. Tejaswini Yerusu | - | L&T Technology Services Limited |
| 3. B. S. K Agrawal | - | Energy Analyst, ICF International |
| 4. Arushi Relan | - | Council on Energy Environment and Water. |
| 5. Shivanjali Yadav | - | Mercados Energy Markets Pvt. Ltd |
| 6. Nikilvish Paliwal | - | Mercados Energy Markets Pvt. Ltd |
| 7. Kumari Shalini | - | Mercados Energy Markets Pvt. Ltd |
| 8. Yash Pal | - | Idam |
| 9. Vangari Upendra | - | Amazon Development Centre Private Limited |
| 10. A. K. Verma | - | Hornbill Labs |
| 11. D. Chakraborty | - | Zeta Suite, Business Intelligence Analyst |
| 12. Jitendra Kumar | - | Academic Associate, SPEEDLABS |
| 13. Md Kaifi Anwar | - | Business Development Asso, Buskills Pvt. Ltd |
| 14. Prerna Kuntal | - | Centre for Energy Regulations, IITK |
| 15. A. K. Verma | - | Research Scholar, MNIT Jaipur |
| 16. Ashish Prajesh | - | Research Scholar, MNIT Jaipur |
| 17. M. S. Choudhary | - | Faculty, Govt Polytechnic College |

BATCH OF 2022

| | | |
|-----------------------|---|--|
| 1. Rohan Roy | - | Tata Power South odisa Distribution Limited |
| 2. Aparna Acharya | - | Maruti Suzuki India Limited |
| 3. Irene Jacob | - | TCS |
| 4. Akanksha Pandey | - | AMNS/Jacobs |
| 5. Kusum Lata | - | Mercados Energy Markets Pvt. Ltd |
| 6. Prafull Arora | - | Mercados Energy Markets Pvt. Ltd |
| 7. Himanshu Bhardwaj | - | Indian Business Venture/ Jacobs |
| 8. Nirupma Sharma | - | Energix |
| 9. Arpit Singh Thakur | - | Prism Johnson Limited |
| 10. Sayida Najm | - | AMNS |
| 11. Vidhu Saini | - | Idam |
| 12. Pawan Tiwari | - | Affine |
| 13. K. Aishwarya | - | Mahindra and Mahindra |
| 14. Dharmendra Saini | - | Affine |
| 15. Aman Jaiswal | - | Affine |
| 16. Mohit K. Meena | - | NPTI Badarpur |
| 17. Hemant Singh | - | HCL Technologies |
| 18. Ruchi Kumari | - | Schneider Electric |
| 19. Saroj | - | Mahindra and Mahindra |
| 20. Madhu Shukla | - | Tata Consulting Engineers |
| 21. Surendra Kumar | - | Cyrun Infra Projects LLP/ Ray's Power Expert |
| 22. Renu Banjarey | - | Mercados Energy Markets Pvt. Ltd |
| 23. Aprajita | - | Idam |
| 24. Vijay Kumar | - | IEX/ Mahindra and Mahindra |
| 25. Arun Gupta | - | MES |

BATCH OF 2023

| | | |
|--------------------|---|--|
| 1. Mukesh Shivran | - | Graduate Trainee Engineer, SUZLON |
| 2. Raja Agarwal | - | Trainee Faculty, Allen Overseas |
| 3. Joydeep Sarkar | - | Analyst, Idam |
| 4. Krupali Sindhav | - | Utility Analyst, EMA Solutions |
| 5. Vaishali Tayal | - | Engineer, SIEMENS Gamesa |
| 6. Kartik Mudgal | - | Management Trainee, APRAAVA |
| 7. Peeyush Gupta | - | Analyst, Idam |
| 8. Harshit Rathore | - | Assistant Manager, ICICI Bank |
| 9. Aditi Choudhary | - | Management Trainee, APRAAVA |
| 10. Swati | - | Analyst, Idam |
| 11. Rishabh Gupta | - | Associate Energy Market Analyst, Energy Exemplar |
| 12. Ravi Trivedi | - | Research Scholar, IIT Bombay |

INTERNSHIPS & PLACEMENTS IN



PUBLICATIONS BY M.Tech. PSM STUDENTS

- Raja Agarwal, et al., "Hydrogen as a Sustainable Mobility Fuel: A Global Perspective and Opportunities for India", IEEE IAS Global Conference on Renewable Energy and Hydrogen Technologies - GlobConHT by :IEEE at Middle East / 1-6 / 2023.
- Ravi Rakeshkumar Trivedi, et al., "Participation of DERs at Transmission Level: FERC Order No.2222 and TSO-DSO Coordination", IEEE Innovative Smart Grid Technologies, ISGT - Middle East by :IEEE at Khalifa University Main Campus, Abu Dhabi, UAE /2023.
- Ravi Rakeshkumar Trivedi, et al., "Peer-to-Peer Energy Trading: Energy Pricing Using Game Theory Models", IEEE IAS Global Conference on Renewable Energy and Hydrogen Technologies - GlobConHT by :IEEE at Male, Maldives /2023.
- Krupali Kamleshbhai Sindhav, et al., "International Hydrogen Strategies: Opportunities for India", IEEE IAS Global Conference on Renewable Energy and Hydrogen Technologies - GlobConHT by :IEEE at Male, Maldives / 2023.
- Harshit Rathore, et al., "Application of Signal Processing and Machine Learning on Power Quality Disturbance With RE Penetration: A Review", 2022 IEEE 9th Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering by :IEEE at Prayagraj, India / 2022.
- Rishabh Gupta, et al., "A Review of Market Based Economic Dispatch in India for Uniform Electricity Pricing", 2023 International Conference on Power, Instrumentation, Energy and Control by :IEEE at Aligarh, India / 1-6 / 2023.
- Harshit Rathore, et al., "Prediction of EV Energy Consumption Using Random Forest and XGBoost", 2023 International Conference on Power Electronics and Energy by :IEEE at Bhubaneswar, India / 2023.
- Raja Agarwal, et al., "Demand Response of HVAC Systems Using Data-Driven Approaches and Modelling Procedure", National Power System Conference by :IEEE at IIT Delhi / 2022.
- Harshit Rathore, et al., "Forecasting of EVs Charging Behavior Using Deep Neural Networks", 4th IEEE International Conference on Communication, Circuits, and Systems by :IEEE at KIIT Bhubaneswar / 2023.
- Harshit Rathore, et al., "Prediction of EV Energy Consumption Using Random Forest and XGBoost", International Conference on Power Electronics and Energy ICPEE-2023 by :IEEE at Bhubaneswar / 2023.
- Vaishali Tayal, et al., "Blockchain Enabled Smart Metering Solutions: Challenges and Opportunities", National Power System Conference by :IEEE at IIT Delhi / 2022.
- Mukesh Shivran, et al., "Privacy Protection and Cost of Privacy in Smart Grid", 2023 IEEE International Conference on Computer, Electronics & Electrical Engineering and Their Applications by :IEEE at NIT, Uttarakhand / 2023.
- Puneet Pahadia, et al., "Resilience Metrics for Integrated Energy Systems: A Review", 2023 5th Biennial International Conference on Nascent Technologies in Engineering (ICNTE), Navi Mumbai, India/ 2023.
- Prabhat Ranjan Mishra, et al., "Carbon Capture Utilization and Storage: Pathways for India", 2022 22nd National Power Systems Conference (NPSC), New Delhi, India/ 2022.
- Vakacharala Bharat Kumar, et al., "False Data Injection Attack: Modelling, Impact Analysis & Detection," 2023 8th international conference for Convergence in Technology (I2CT)/ 2023.
- Saroj Jhahriya, et al., "Peer-To-Peer Energy Trading: A Review and Indian Scenario," IEEE Delhi Section International Conference on Electrical, Electronics, and Computer Engineering/ 2022.
- Aparna Acharya, et al., "Major Blackouts of the Decade: Underlying Causes, Recommendations and Arising Challenges," 9th IEEE International Conference on Power Systems/ 2021.
- Vijay Kumar, et al., "Solar Photovoltaic On Water Bodies in Rajasthan," 9th IEEE International Conference on Power Systems, / 2021.
- Renu Banjarey, et al., "Electric Vehicle Policies in Indian States: Key learning from International experiences," 9th IEEE International Conference on Power Systems / 2021.
- Dharmendra Saini, et al., "Power Flow in Hybrid AC DC Microgrid: A Comprehensive Review," International Conferences on Recent Trends in Electrical and Electronics Engineering/ 2021.
- Himanshu Bhardwaj, et al., "Short-Circuit Analysis of Modern Distribution System: A Comprehensive Review," International Conference on Recent Trends in Electrical and Electronics Engineering/ 2021.
- Irene Jacob, et al., "Optimal Design of Thermionic Generator for High Power and High Efficiency Applications," IEEE 8th Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering/ 2021.
- Irene Jacob, et al., "Optimal Operation of Microgrid: A Comprehensive Review," 36th National Convention of Electrical Engineers and National Conference/ 2021.
- Kumari Aishwarya, et al. "Generation Flexibility of Power System A Review," 36th National Convention of Electrical Engineers and National Conference/ 2021.
- Ajay kumar Verma, et al., "Classification of Wind Forecasting Methods Based on Time Horizon and Methodology: A Review," International Conference on Advances in Systems, Control and Computing by Springer, Jaipur, India/ 2020.
- Arushi Relan, et al., "Optimal Siting of Electric Vehicle Battery Swapping Stations with Centralized Charging," IEEE International Conference on Power Electronics, Drives and Energy Systems, Jaipur, India/ 2020.
- Arushi Relan, et al., "Game theoretic Bidding Approach for Peer-to-Peer Trading," IEEE International Women in Engineering Conf. on Electrical and Computer Engineering/ 2020.
- Chandra Prakash Barala, et al., "Coordinated Scheduling of Virtual Energy Storage System for Optimal Microgrid Operation," 9th IEEE Power India International Conference, Sonapat, India/ 2020.
- Dheeraj Verma, et al., "COVID19: Impact on Indian Power Sector," 5th IEEE International Conference on Recent Advances and Innovations in Engineering, Jaipur, India/ 2020.

PUBLICATIONS BY M.Tech. PSM STUDENTS

- Deepak Singh, et al., "Analysis of the Impact of AC Faults and DC Faults on the HVDC Transmission Line," International Conference on Machine learning, Advances in Computing, Renewable Energy and Communication by Springer, UP, India/ 2020.
- Deboleena Chakraborty, et al., "DSM penalty in Forecasting and Scheduling regulation for RE generators," EMagazine, Windpro, Indian Wind Power Association/ 2020.
- Kumari Shalini et al., "AI Techniques Based Fault Location and Restoration Methods: A Review," International Conference on Advances in Systems, Control and Computing by Springer, Jaipur, India/ 2020.
- Hadiya Nilesh Babubhai, et al., "A Comparative Analysis of Pricing Mechanisms to Enable P2P Energy Sharing of Rooftop Solar Energy," IEEE International Conference on Power Systems Technology, Bangalore, India/ 2020.
- Hadiya Nilesh Babubhai, et al., "Blockchain: Elements of Physical Architecture, Empowering Features and Applications in the Indian Power Sector," 21 National Power Systems Conference, Gandhinagar, India/ 2020.
- Prerna Kuntal, et al., "Scheduling of Hybrid Power System: A Review on Application of Optimization Approaches," International Conference on Advances in Systems, Control and Computing by Springer, Jaipur, India/ 2020.
- Sanikommu Eashwar Reddy, et al., "Contactless Active Cell Balancing Method for Battery Management Systems," International Conference on Power, Energy, Control and Transmission Systems, Chennai, India/ 2020.
- Umesh Saini, et al., "Univariant Time Series forecasting of Agriculture load by using LSTM and GRU RNNs," IEEE Students Conference on Engineering & Systems, Prayagraj, India/ 2020.
- Chandra Prakash Barala, et al., "Optimal Scheduling for Residential Building Based on Virtual Energy Storage System," 8th IEEE International Conference on Power Systems, Jaipur, India/ 2019.
- Hadiya Nilesh Babubhai, et al., "Identifying the Potential for Peer-to-Peer Trading of Rooftop Solar Power for Indian Scenario," 8th IEEE International Conference on Power Systems, Jaipur, India/ 2019.
- Hadiya Nilesh Babubhai, et al., "Avenues for Blockchain Implementation in Decentralized Power Trading," ICONEER by Elsevier, Jaipur, India/ 2019.

IEEE POWER & ENERGY STUDENT BRANCH CHAPTER



Students of Power Systems Management program at MNIT Jaipur along with their faculty advisor Dr. Satish Sharma, founded **IEEE Power & Energy Society Student Branch Chapter** at MNIT Jaipur. The chapter connects students, faculty, and industry professionals on innovation happening in the power sector and challenges can be mitigated through collaborations. It helps in attaining managerial skills and leadership quality. Students develop their own solutions on the technical challenges in the electric power industry.

PIONEERING SKILLS

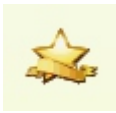


NATIONAL COLLABORATIONS

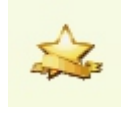


INTERNATIONAL COLLABORATIONS





ACHIEVEMENTS



POSOCO Power System Awards

MNIT Jaipur won the highest number of **POSOCO Power Systems Awards, 2021**, with two scholars from the first batch of Power Systems Management program, **C.P. Barala** and **N.P. Hadiya**, securing awards for research excellence in M.Tech dissertation at the national level. Maintaining this streak **Shivanjali Yadav**, scholar from second batch has won the POSOCO Power Systems Awards, 2022. Following in the footsteps, **Aparna Acharya** and **Kusum Lata** from the third batch have also received the POSOCO Power Systems Awards 2023.

LEARNING OPPORTUNITIES

Industry Engagement Opportunities

- Industry can support their existing/potential employees on sponsored seats.
- Industry can offer scholarship to GATE qualified admitted students and hire them as interns after two semesters.
- Students can join industry internships in their III and IV semesters, and get to work on live industry challenges.
- Students are qualified for employment in power sector utilities, PSUs, consulting firms, regulatory bodies, research organizations in area of power system and power markets including POSOCO, CERC, SERC, NTPC, PGCIL, IEX, Tata Power, Adani, Reliance, JSW Power, and SEBs.

Workshops and Industry Engagement

- International Level Short Term Course on “Multi-Agent and Microgrids Concepts”, at MNIT, Jaipur on 2nd – 6th June, 2022.
- SPARC-2nd Workshop on "SMART GRIDS: Future Intelligent Electricity Distribution Grids", organized by MNIT Jaipur and Cardiff University (UK) on 4th -14th February 2022.
- SPARC-1st Workshop on "Evolving Energy Sector and Markets", organized by MNIT Jaipur and Cardiff University (UK) on 20th March -16th May, 2021.
- Short-term course on “Restructured Electricity Supply System: Operation and Planning” at MNIT Jaipur on 14th - 18th March, 2021.
- A five day short course on “Smart Grid and Electricity Markets” organized by IEEE Rajasthan subsection at MNIT, Jaipur on 3rd - 7th February, 2021.
- Faculty Development program on “Data Analytics using R” by AICTE Training and Learning (ATAL) academy, at MNIT, Jaipur on 14th -18th December, 2020.
- Collaboration for software model on "Security Constrained Economic Dispatch for Inter State Generating Stations pan India" of POSOCO, India.
- Summer School at Indo German Centre for Sustainability (IGCS), Germany on "Smart Grids: Electricity Networks as the Backbone of a Carbon Neutral Society", on 15th -16th June, 2019.
- Workshop on PSS[®]E Software at MNIT Jaipur on 8th - 9th June, 2019.
- Workshop for Civil Society Organization and CONASC partners in Rajasthan. A Consumer centric training event organized by BASK Research Foundation at Jaipur on 7th - 8th June, 2019.
- Workshop on "Energy Storage: The Future of Energy" by AICTE Training and Learning (ATAL) Academy, at MNIT Jaipur on 11th -15th March, 2019.
- Workshop on "Large Renewable Energy Grid Integration: Challenges & Operational Strategies" at National Power Training Institute, Faridabad on 27th -28th February, 2019.
- Faculty Development Programme on "Smart Power and Automation" at Central Power Research Institute, Bangalore on 17th -18th January, 2019.
- Workshop on "Energy and Power Systems Optimization using GAMS" at MNIT Jaipur on 8th-12th January, 2019.

Contact Details:

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