Hydrogen Network India
Industrial Training. Technology. Consulting.

Hydrogen Education & Hands-On Workshop Programmes

Fuel Cells & Water Electrolysers

Bridging Theory and Practice in Hydrogen Technologies

Hydrogen Network India

INDUSTRIAL TRAINING • TECHNOLOGY • CONSULTING

Introduction & Educational Philosophy

Our Mission

Hydrogen Network India delivers structured, hands-on educational workshops focused on hydrogen fuel cells and water electrolysers. Our core philosophy is to bridge the gap between classroom theory and real-world system operation.

Designed For

- Universities and Academic Institutions
- Research Labs and Technology Centres
- Industrial Training Centres
- Corporate R&D and Engineering Teams

Our Approach

We emphasize learning through direct experimentation. Participants gain confidence by handling real equipment, conducting industry-relevant testing, and analyzing performance data. Our curriculum ensures a strong grounding in fundamentals while fostering safety awareness and system-level thinking.

Note: *No prior hands-on hydrogen experience is required for our introductory programmes.*

Why Hands-On Hydrogen Education?

Hydrogen technologies involve complex interactions between electrochemistry, thermodynamics, fluid dynamics, control logic, and safety protocols. These systems cannot be fully understood through theory alone.

🔗 Direct Linkage

See immediate correlation between theoretical equations and experimental results.

⚖️ Real-World Trade-offs

Understand how variables like temperature, pressure, and flow rates affect efficiency and durability.

🏭 Industry Relevance

Gain exposure to standard testing protocols used in commercial R&D environments.

🔬 Research-Ready

Build experimental capabilities for advanced research and development work.

Who Can Attend?

🎓 Students

Undergraduate and postgraduate students looking to supplement coursework with practical skills.

🔬 Research Scholars

PhD candidates and researchers seeking deep experimental insights for thesis work.

👩‍🏫 Faculty & Staff

Faculty members and technical staff enhancing laboratory capabilities and teaching modules.

🏢 Industry Professionals

Workforce upskilling for the emerging hydrogen economy and clean energy transition.

Introductory workshops are designed to be accessible to those with no prior hydrogen or engineering background.

Workshop Formats

1-Day Workshop

Introductory Level
Foundation concepts and basic experiments

2-Day Workshop

Intermediate Level
Advanced theory and parametric testing

3-Day Workshop

Advanced / Research-Oriented
In-depth analysis and system optimisation

Custom-Designed

Tailored Solutions
Customized to your specific requirements

Workshop Structure

The core of our programme is a balanced mix of classroom instruction and laboratory experimentation.

1-Day Workshop | Introductory

THEORY

- Introduction to hydrogen energy systems
- Working principle of PEM fuel cells
- Fundamentals of water electrolysis
- Voltage losses and efficiency concepts
- Hydrogen safety fundamentals

EXPERIMENTS

- Polarization curve (V–I) and power density curve
- Electrolyser performance characterisation
- Hydrogen production rate calculations
- Voltage efficiency and energy consumption analysis
- Basic system start-up, shut-down, and safety checks

2-Day Workshop | Intermediate

(Includes all 1-day workshop content + the following)

THEORY

- Activation, ohmic, and mass transport losses
- Gas stoichiometry and utilisation
- Effect of anode and cathode flow rates
- Water management and membrane hydration
- Temperature effects on kinetics and conductivity
- Faradaic efficiency and charge balance

EXPERIMENTS

- Hydrogen starvation testing
- Air (oxygen) starvation testing
- Temperature dependence study
- Anode flow-rate sensitivity testing
- Cathode flow-rate sensitivity testing
- Water flow-rate sensitivity analysis
- Faradaic efficiency measurement

3-Day Workshop | Advanced / Research-Oriented

(Includes all 1-day and 2-day workshop content + the following)

THEORY

- Kinetic and transport limitations
- Pressure effects on performance and durability
- Transient behaviour and dynamic operation
- Start-up and shut-down phenomena
- Fault modes and recovery mechanisms
- Membrane degradation mechanisms
- Effect of catalyst loading
- System efficiency vs component efficiency
- Scale-up and industrial testing considerations

EXPERIMENTS

- Pressure dependence study
- Gas flow-rate optimisation and stoichiometry analysis
- Transient response and load cycling tests
- Fault detection and performance recovery analysis
- Gas crossover and hydrogen purity testing
- Long-duration stability and durability cycling
- Membrane degradation assessment
- Performance comparison using different catalyst loadings

Custom-Designed Workshops

We understand that every institution has unique goals. Our programmes can be fully tailored to your specific requirements.

📋 Options

Fuel cell focus, Electrolyser focus, or Combined programmes

🎯 Flexibility

Customisation of duration, technical depth, application focus, and curriculum integration

🎓 Capacity Building

Faculty enablement sessions to ensure long-term equipment usage and institutional capability development

What We Provide

Complete Training Package

- Professional fuel cell and electrolyser training equipment
- Detailed lab manuals and standard operating procedures
- Comprehensive hydrogen safety manuals
- Sample datasets and professional report formats
- Structured testing protocols for consistent results
- On-site expert trainers and facilitators

Learning Outcomes

Upon completion, participants will be able to:

- Develop a practical, hands-on understanding of hydrogen energy systems
- Interpret experimental data confidently and identify performance trends
- Understand real-world operating trade-offs and efficiency factors
- Gain exposure to current research methodologies and industry testing practices

Get Started Today

We invite universities, research institutions, training centres, and industry organizations to explore how our hands-on hydrogen workshops can enhance your educational offerings and build critical competencies in this rapidly growing field.

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What's Next?

- Request a customized proposal for your institution
- Schedule a demonstration session
- Discuss equipment and facility requirements
- Explore funding and partnership opportunities

All workshop programmes can be delivered on-site at your institution or at our training facilities. We provide all necessary equipment, materials, and safety protocols. Custom durations and schedules available to fit academic calendars and institutional needs.