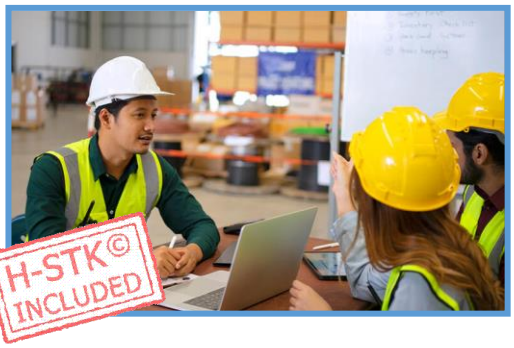
COURSE OVERVIEW EE1107
Demand Response

Course Title
Demand Response



Course Date/Venue
Session 1: September 01-05, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 15-19, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
EE1107

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Demand Response. It covers the key drivers and motivations for implementing DR and the benefits of DR for utilities and consumers; the types of demand response programs, key components of DR systems, regulatory and market frameworks for DR and the role of smart grids in DR; the technological challenges and barriers and peak load fluctuations; the legal and regulatory obstacles, smart metering and advanced metering infrastructure (AMI); and the automated DR systems and communication technologies for DR.

Further, the course will also discuss the role of energy storage systems in DR; the types of energy storage technologies and benefits of combining storage with DR for peak shaving; the demand-side management (DSM) and demand response; the tools and techniques for real-time demand forecasting; and the machine learning, predictive analytics for DR and data visualization and reporting.

During this interactive course, participants will learn the designing of DR programs for different market segments; the customer enrollment and incentives, load forecasting and event management; the integration of DR with renewable energy sources; the technological solutions for DR coordination and legal, ethical and regulatory considerations; the virtual power plants (VPP) and demand response, DR in microgrids and dynamic pricing models; the role of artificial intelligence in DR optimization, blockchain in demand response, DR and grid stability and emerging trends in demand response; the DR and climate change mitigation, smart cities and demand response; and the future of utility-consumer relationships in DR.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on demand response
- Discuss the key drivers and motivations for implementing DR and the benefits of DR for utilities and consumers
- Identify the types of demand response programs, key components of DR systems, regulatory and market frameworks for DR and the role of smart grids in DR
- Recognize the technological challenges and barriers, manage peak load fluctuations and discuss legal and regulatory obstacles
- Identify smart metering and advanced metering infrastructure (AMI), automated DR systems and communication technologies for DR
- Define the role of energy storage systems in DR and identify the types of energy storage technologies including the benefits of combining storage with DR for peak shaving
- Differentiate demand-side management (DSM) and demand response and apply tools and techniques for real-time demand forecasting, machine learning and predictive analytics for DR and data visualization and reporting
- Design DR programs for different market segments and apply customer enrollment and incentives, load forecasting and event management
- Integrate DR with renewable energy sources and implement technological solutions for DR coordination
- Determine legal, ethical and regulatory considerations, virtual power plants (VPP) and demand response, DR in microgrids and dynamic pricing models and DR
- Discuss the role of artificial intelligence in DR optimization, blockchain in demand response, DR and grid stability and emerging trends in demand response
- Discuss DR and climate change mitigation, smart cities and demand response and the future of utility-consumer relationships in DR

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of demand response for power system engineers, energy managers, grid operators / dispatchers, utility company planners, regulatory and policy analysts, load forecasting specialists, smart grid technology developers, renewable energy integrators, facilities and building energy managers, SCADA and automation engineers, industrial energy users, commercial building operators, it and data analysts in energy sector, consultants in energy efficiency or DSM and other technical staff.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Dr. Ahmed El-Sayed, PhD, MSc, BSc, is a **Senior Electromechanical Engineer** with over **30 years** of extensive experience in the **Power**, **Petroleum**, **Petrochemical** and **Utilities**. He specializes in **HV/LV Equipment**, **High Voltage Electrical Safety**, **LV & HV Electrical System**, **HV Equipments Inspection & Maintenance**, **HV Switchgear Operation & Maintenance**, **LV Distribution Switchgear & Equipment**, **HV Switchgear Maintenance**, **HV/LV Electrical** Authorisation, **Hazardous Area Classification, Power Quality**, **Disturbance Analysis**, **Blackout**, **Power Network**, **Power Distribution**, **Power Systems Control**, **Power Systems Security**, Power **Electronics**, **ETAP**, Electrical **Substations**, Tariff Design & Structure Analysis, **Engineering Drawings, Codes & Standards**, **P&ID Reading, Interpretation & Developing**, **PLC**, **SCADA**, **DCS**, **Process Control**, **Instrumentation**, **Automation**, Power **Generation**, **Process Control Instrumentation**, **SIS**, **SIL**, **ESD**, **Alarm Management Systems**, **Fieldbus Systems** and **Fiber Optics** as well as the service pricing of these. Further, he is also well versed in **Pumps**, **Valves**, **Boilers**, **Pressure Vessels**, **Heat Recovery Steam Generators** (**HRSG**), **Bearings**, **Compressors**, **Motors**, **Turbines**, **Actuators**, **Carbon Footprint**, **Energy Efficiency**, **Power Plant Performance & Efficiency**, **P&ID**, **Engineering Drawing**, **Codes & Standards** and **Hydraulic Systems** He is currently the **Systems Control Manager** of **Siemens** where he is in-charge of Security & Control of Power **Transmission Distribution** & **High Voltage** Systems and he further takes part in the Load Records Evaluation & Transmission Services Pricing.

During his career life, Dr. Ahmed has been actively involved in different Power System Activities including Roles in Power System Planning, Analysis, Engineering, **HV Substation** Design, Electrical Service Pricing, Evaluations & Tariffs, Project Management and also in Teaching and Consulting. His vast industrial experience was honed greatly when he joined many International and National Companies such as **Siemens**, **Electricity Authority** and **ACETO** industries where he focused more on dealing with Technology Transfer, System Integration Process and Improving Localization. He was further greatly involved in manufacturing some of **Power System** and **Control & Instrumentation Components** such as Series of Digital Protection **Relays**, MV **VFD**, **PLC** and **SCADA** System with intelligent features.

Dr. Ahmed is well-versed in different electrical and instrumentation fields like Load Management Concepts, **PLC** Programming, Installation, Operation and Troubleshooting, **AC Drives** Theory, Application and Troubleshooting, Industrial Power Systems Analysis, AC & DC **Motors**, Electric Motor **Protection**, **DCS SCADA**, **Control** and Maintenance Techniques, Industrial Intelligent Control System, **Power Quality** Standards, Power Generators and Voltage Regulators, Circuit Breaker and Switchgear Application and Testing Techniques, **Transformer** and **Switchgear** Application, Grounding for Industrial and Commercial Assets, Power Quality and **Harmonics**, **Protective Relays** (O/C Protection, Line Differential, Bus Bar Protection and **Breaker Failure Relay**) and Project Management Basics (PMB).

Dr. Ahmed has **PhD**, **Master's** & **Bachelor's** degree in **Electrical** and **Instrumentation Engineering** from the **University of Wisconsin Madison**, **USA**. Further, he has numerous papers published internationally in the areas of Power Quality, Superconductive Magnetic Energy Storage, SMES role in Power Systems, Power System **Blackout** Analysis, and Intelligent Load Shedding Techniques for preventing Power System Blackouts, HV **Substation Automation** and Power System Stability.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Demand Response*** *Definition & Principles of DR • Historical Context & Evolution of DR • Key Drivers & Motivations for Implementing DR • Benefits of DR for Utilities & Consumers*
0930 – 0945	*Break*
0945 – 1030	***Types of Demand Response Programs*** *Price-Based Demand Response (Dynamic Pricing) • Incentive-Based Demand Response (Direct Load Control) • Emergency DR Programs • Ancillary Service DR Programs*
1030 – 1130	***Key Components of DR Systems*** *DR Resources: Customers, Aggregators, Utilities • Communication Technologies in DR Systems • Smart Meters & their Role in DR • Data Collection & Analytics*
1130 - 1230	***Regulatory & Market Frameworks for DR*** *DR Policies & Regulations in the Energy Market • Market Structures for DR Participation • DR's Role in Balancing Supply & Demand • International DR Frameworks & Standards*
1230 – 1245	*Break*
1245 – 1335	***The Role of Smart Grids in DR*** *How Smart Grids Enable DR • Advanced Metering Infrastructure (AMI) • Grid Communication Systems • Energy Storage & Integration with DR*

1335 - 1420	***Challenges in Implementing DR*** *Technological Challenges & Barriers • Customer Engagement & Participation • Managing Peak Load Fluctuations • Legal & Regulatory Obstacles*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 - 0830	***Smart Metering & Advanced Metering Infrastructure (AMI)*** *Key Features & Functions of Smart Meters • How AMI Supports DR Programs • Data Collection & Real-Time Analytics • Customer Feedback Through Smart Meters*
0830 - 0930	***Automated DR Systems*** *Types of Automation in DR (e.g., Automated Load Control) • Benefits of Automation for Grid Operators & Customers • Integration of Home Energy Management Systems (HEMS) • Case Studies of Automated DR Systems*
0930 – 0945	*Break*
0945 – 1100	***Communication Technologies for DR*** *Communication Protocols (e.g., Zigbee, Wi-Fi, Cellular) • Role of IoT in DR Systems • Remote Control & Monitoring of Devices • Security Concerns & Data Privacy*
1100 – 1230	***Energy Storage & DR Integration*** *The Role of Energy Storage Systems in DR • Types of Energy Storage Technologies (Batteries, Pumped Storage, etc.) • Benefits of Combining Storage with DR for Peak Shaving • Case Studies of Successful Energy Storage-DR Integration*
1230 – 1245	*Break*
1245 – 1330	***Demand-Side Management (DSM) versus Demand Response*** *Key Differences Between DSM & DR • How DSM Programs Complement DR • Role of DR in DSM Strategy • Market & Regulatory Considerations*
1330 - 1420	***Real-Time Data Analysis for DR*** *Tools & Techniques for Real-Time Demand Forecasting • Machine Learning & Predictive Analytics for DR • Data Visualization & Reporting • Use Cases of Real-Time Data in DR Optimization*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 - 0830	***Designing DR Programs for Different Market Segments*** *Residential versus Commercial/Industrial Demand Response • Customizing DR Programs Based on Customer Needs • DR Pricing Models for Different Segments • Understanding Customer Behavior & Engagement*
0830 - 0930	***Customer Enrollment & Incentives*** *Strategies for Customer Enrollment in DR Programs • Designing Financial Incentives & Rewards • Customer Communication Strategies • Use of Mobile Apps & Digital Platforms for DR Participation*

0930 – 0945	*Break*
0945 – 1100	***Load Forecasting & Event Management*** *Methods for Load Forecasting & Predicting Peak Demand • Managing DR Events: Notifications, Alerts & Load Curtailment • Optimizing DR Event Timing for Grid Stability • Real-World Examples of Effective Event Management*
1100 – 1230	***Integration of DR with Renewable Energy Sources*** *How DR Can Support Renewable Energy Integration • Balancing Intermittent Renewable Generation with DR • Grid Flexibility Through Demand-Side Management • Storage & DR Synergy with Renewable Energy*
1230 – 1245	*Break*
1245 – 1330	***Technological Solutions for DR Coordination*** *Software Platforms for DR Coordination & Optimization • Role of DRMS (Demand Response Management Systems) • Use of AI & Machine Learning in DR Optimization • Data-Driven Decision-Making for Program Management*
1330 - 1420	***Legal, Ethical & Regulatory Considerations*** *Compliance with Local & International Regulations • Customer Privacy & Data Protection • Legal Issues Surrounding Utility Demand Response Programs • Addressing Challenges in Cross-Border DR Operations*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 - 0830	***Virtual Power Plants (VPP) & Demand Response*** *Concept of Virtual Power Plants in the Context of DR • How VPPs Aggregate Distributed Energy Resources for DR • Benefits & Challenges of VPPs in DR Implementation • Case Studies of Successful VPP-Demand Response Integration*
0830 - 0930	***DR in Microgrids*** *Role of DR in Microgrid Operations • Integrating DR Into Community-Based Energy Systems • Challenges of Implementing DR in Remote or Off-Grid Locations • Case Studies of Microgrids Using DR*
0930 – 0945	*Break*
0945 – 1100	***Dynamic Pricing Models & DR*** *Real-Time Pricing Models & their Impact on DR • Critical Peak Pricing (CPP), Time-of-Use (TOU) & Demand Charge Pricing • Customer Response to Dynamic Pricing Signals • Design & Implementation of Dynamic Pricing Strategies*
1100 – 1230	***The Role of Artificial Intelligence in DR Optimization*** *AI Algorithms for Load Forecasting & DR Event Scheduling • Predictive Models for Consumer Participation • Machine Learning for Dynamic Pricing Optimization • AI-Based Tools for Enhancing DR Program Effectiveness*
1230 – 1245	*Break*
1245 – 1330	***Blockchain in Demand Response*** *How Blockchain Technology can Enhance DR Security & Transparency • Blockchain for Automating DR Transactions & Settlements • Benefits of Blockchain in Customer Incentives & Rewards • Pilot Projects & Potential Future Applications*

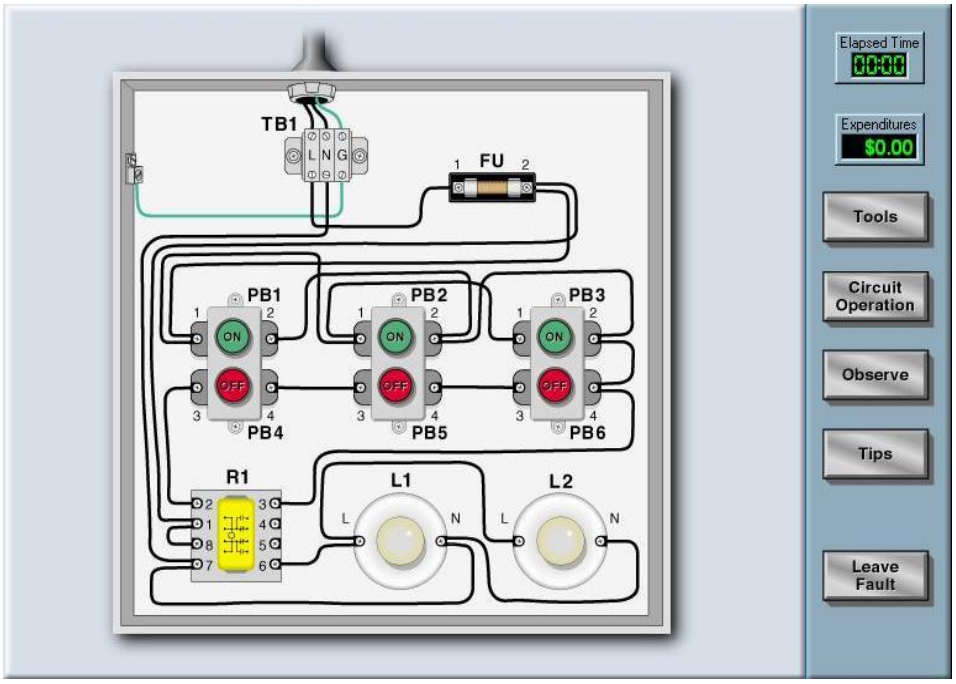
1330 - 1420	***DR & Grid Stability*** *How DR Supports Grid Reliability & Stability • DR as a Tool for Mitigating Frequency & Voltage Issues • Case Studies of DR Used During Grid Disturbances • Role of DR in Emergency Response Scenarios*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

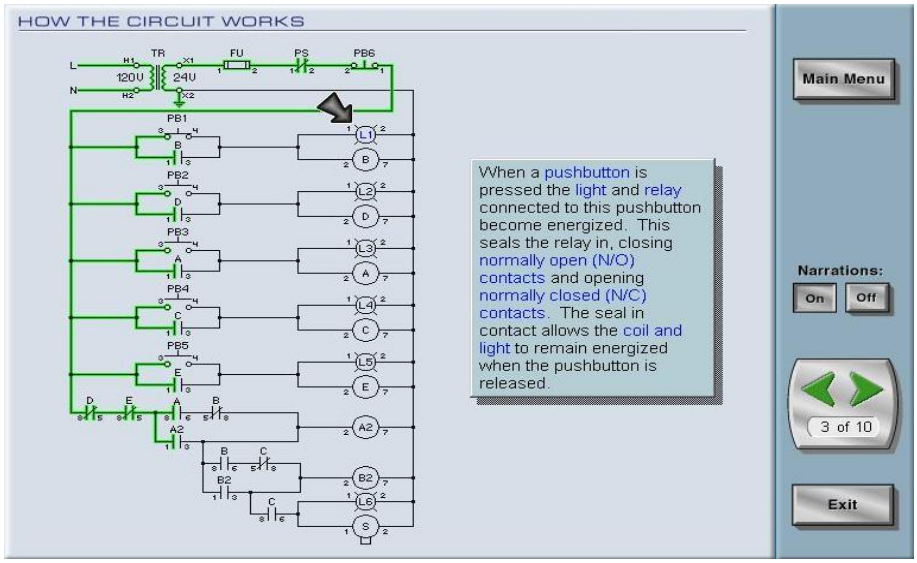
Day 5

0730 - 0830	***Emerging Trends in Demand Response*** *The Evolution of DR Technologies & Strategies • Smart Homes & IoT as a Part of Future DR • Role of Blockchain & AI in Future DR Systems • Customer-Centric Models for DR*
0830 - 0930	***International Case Studies of Successful DR Programs*** *Lessons Learned from Global DR Implementation • Case Study of DR in the US, Europe & Asia • Performance & Impacts of Large-Scale DR Programs • Identifying Successful Models for Replication in the UAE*
0930 – 0945	*Break*
0945 – 1100	***DR & Climate Change Mitigation*** *How DR can Contribute to Reducing Greenhouse Gas Emissions • Role of DR in Supporting Sustainable Energy Systems • Policy & Regulatory Frameworks to Encourage DR for Environmental Goals • Examples of DR Programs with Environmental Benefits*
1100 – 1230	***Smart Cities & Demand Response*** *Integration of DR into Smart City Initiatives • How DR can Enhance Urban Energy Efficiency & Sustainability • Role of DR in Smart Grids & Urban Planning • Case Studies of DR in Smart City Projects*
1230 – 1245	*Break*
1245 – 1345	***The Future of Utility-Consumer Relationships in DR*** *Evolving Utility Business Models with DR • Impact of DR on Customer Engagement & Loyalty • Data-Driven Insights for Improving Utility-Consumer Interactions • Enhancing Consumer Participation Through Education & Incentives*
1345 - 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator "Simutech Troubleshooting Electrical Circuits V4.1".





Simutech Troubleshooting Electrical Circuits V4.1

Course Coordinator

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