COURSE OVERVIEW EE1190
Advanced Power System Analysis using ETAP

Course Title
Advanced Power System Analysis using ETAP

Course Reference
EE1190

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



Course Date/Venu

Session(s)	Date	Venue
1	November 08-12, 2026	Boardroom 2, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
2	November 22-26, 2026	Boardroom 2, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

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 Advanced Power System Analysis using ETAP. It covers the ETAP software, single line diagrams (SLD), equipment libraries and data input; the modeling power system components and per unit system and project management in ETAP; the load flow analysis fundamentals, load flow in ETAP, voltage profile and power loss analysis; the short circuit analysis basic, short circuit simulation in ETAP and protection coordination basics; and the advanced protection coordination, time-current curve (TCC) analysis, motor starting analysis and harmonic analysis.

During this interactive course, participants will learn the harmonic simulation in ETAP, power factor correction and transient stability analysis; the dynamic simulation in ETAP, arc flash analysis and arc flash simulation in ETAP; the reliability analysis, contingency analysis and optimal power flow (OPF) in ETAP; the renewable energy integration covering modeling solar and wind systems, intermittency challenges, grid impact analysis and hybrid system modeling; and the energy management systems (EMS) and automation and reporting in ETAP.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain a comprehensive knowledge on power system analysis using ETAP
- Discuss ETAP software, building single line diagrams (SLD), equipment libraries and data input
- Identify modeling power system components, per unit system in ETAP and project management in ETAP
- Carryout load flow analysis fundamentals, performing load flow in ETAP and voltage profile and power loss analysis
- Apply short circuit analysis basic, short circuit simulation in ETAP and protection coordination basics
- Employ advanced protection coordination, time-current curve (TCC) analysis, motor starting analysis and harmonic analysis
- Carryout harmonic simulation in ETAP, power factor correction and transient stability analysis
- Apply dynamic simulation in ETAP, arc flash analysis and arc flash simulation in ETAP
- Employ reliability analysis, contingency analysis and optimal power flow (OPF) in ETAP
- Apply renewable energy integration covering modeling solar and wind systems, intermittency challenges, grid impact analysis and hybrid system modeling
- Recognize energy management systems (EMS) and apply automation and reporting in ETAP

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 advanced power system analysis using ETAP for engineering supervisors and managers, consultants and technical specialists, utility and industrial power professionals, project engineers, senior electrical engineers (implied senior roles within engineering tracks), power system engineers, protection and control engineers, electrical design engineers, SCADA and EMS engineers, renewable energy engineers, commissioning engineers, maintenance engineers, electrical engineers (general roles / entry to mid-level), ETAP users and beginners 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

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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 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 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 Electrical & Instrumentation Engineer** with over **30 years** of extensive experience in the **Oil**, **Gas**, **Power**, **Petroleum**, **Petrochemical** and **Utilities**. He specializes in **P&ID** Reading & Interpretation, **Engineering Drawings**, **Electrical Drawing & Schematics, Electrical Drawing & Wiring,** Developing & Revising **Engineering Drawing**, **Piping & Instrument Drawing** Reading, **Electrical & Instrument Drawings**, **Relay** Design & Maintenance, **Relay** Programming, **Relay** Construction & Functions, **Protective Relaying**, **Relay** Coordination, **Siemens Protection Relays**, **Power System Protection Relays & Hardware**, **Electrical Power System Protection Relays**, **Electrical Faults & Relay** Protection, **ABB Relay** REG 216, **Fault Calculation Relay**, Modern **Power System Protective Relaying**, **Power System Study on ETAP**, **ETAP-Power System Analysis**, **Flow Measurement** Foundation, **Hydrocarbon** Measurement & Sampling, **Gas Dosiers** Preparation, **Gas/Liquid Fuel** Measurement, **Instrumentation Measurement & Control System**, **Flow** Measurement, **Pressure** Measurement, **Level & Temperature** Measurement, **Measurement Devices & Control System**, **Instrumentation & Control** Systems, **Control System** Orientation, Uninterruptible Power Supply (**UPS**) **Battery Charger**, **Industrial UPS Systems Construction & Operation**, **Test Lead-Acid & Ni-cad Battery Systems**, **Hazards & Safe Work Practice**s, **Transformer** Operational Principles, Selection & Troubleshooting; **HV & LV Transformers**, **Control Valves & Actuators**, **Electrical Safety**, **Protection Relay Application**, **Maintenance & Testing**, **NEC** (National Electrical Code), **NESC** (National Electrical Safety Code), **Electrical Safety**, **Electrical Hazards Assessment**, **Electrical Equipment**, **Personal Protective Equipment**, Lock-Out & Tag-Out (**LOTO**), Confined Workspaces, Alerting Techniques, Electrical Transient Analysis Program (**ETAP**), Power **Quality**, Power **Network**, Power **Distribution**, **Distribution Systems**, **Power Systems Control**, **Power Systems Security**, Power **Electronics**, Electrical **Substations**, **UPS** & **Battery System**, **Earthing & Grounding**, Power **Generation**, **Protective Systems**, **Electrical Generators**, **Power** & **Distribution Transformers**, **Electrical Motors**, **Switchgears**, **Transformers**, **AC** & **DC Drives**, **Variable Speed Drives** & **Generators**, **Generator Protection**, **GE Gas Turbines**, PLC, SCADA, DCS, Process Control, Control Systems & Data Communications, Instrumentation, Automation, Valve Tuning, SIS, SIL, ESD, Alarm Management Systems, Engine Management System, Bearing & Rotating Machine, Fieldbus Systems and Fiber Optics Technology. 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, 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 as the **Instrumentation & Electrical Service Project Manager**, **Instrumentation & Control Engineer**, **Energy Management Engineer**, **Department Head**, **Assistant Professor**, **Instrumentation & Control Instructor**, **Project Coordinator**, **Project Assistant and Managing Board Member** 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 **ETAP**, 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 Engineering** from the **University of Wisconsin Madison**, **USA** and **Ain Shams University**, respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/ Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), an active member of IEEE and ISA as well as numerous technical and scientific 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. He has further delivered numerous trainings, seminars, courses, workshops and conferences internationally.

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop 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	***Introduction to ETAP Software*** *Overview of ETAP Capabilities • Applications in Power System Analysis • Interface and Navigation Basics • Project Setup and Configuration*
0930 – 0945	*Break*
0945 – 1030	***Building Single Line Diagrams (SLD)*** *Creating System Topology • Adding Buses, Generators and Loads • Connecting System Components • Best Practices for SLD Modeling*
1030 – 1130	***Equipment Libraries & Data Input*** *Using ETAP Libraries • Inputting Equipment Parameters • Customizing Components • Data Validation Techniques*
1130 – 1215	***Modeling Power System Components*** *Generators and Motors • Transformers and Cables • Transmission Lines • Load Modeling Techniques*
1215 – 1230	*Break*
1230 – 1330	***Per Unit System in ETAP*** *Base Values Selection • Conversion to per Unit Values • Advantages in Simulation • Application in ETAP Studies*

1330 – 1420	***Project Management in ETAP*** *Scenario Creation and Management • Version Control • Data Backup and Recovery • Documentation and Reporting*
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	***Load Flow Analysis Fundamentals*** *Purpose of Load Flow Studies • Types of Buses (Slack, PV, PQ) • Newton-Raphson Method Basics • Convergence Criteria*
0830 – 0930	***Performing Load Flow in ETAP*** *Setting Up Load Flow Cases • Running Simulations • Interpreting Results • Identifying System Issues*
0930 – 0945	*Break*
0945 – 1100	***Voltage Profile & Power Loss Analysis*** *Voltage Drop Assessment • Power Losses in Lines and Transformers • Improving Voltage Profiles • Optimization Techniques*
1100 – 1215	***Short Circuit Analysis Basics*** *Types of Faults (Symmetrical, Unsymmetrical) • Fault Current Calculations • IEC versus ANSI Standards • Impact on System Design*
1215 – 1230	*Break*
1230 – 1330	***Short Circuit Simulation in ETAP*** *Configuring Fault Scenarios • Running Short Circuit Studies • Analyzing Results • Equipment Rating Verification*
1330 – 1420	***Protection Coordination Basics*** *Relay Types and Functions • Coordination Principles • Time-Current Curves (TCC) • Basic Relay Settings*
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	***Advanced Protection Coordination*** *Detailed Relay Coordination • Selectivity and Sensitivity • Coordination Curves Analysis • Minimizing Fault Impact*
0830 – 0930	***Time-Current Curve (TCC) Analysis*** *Plotting TCC in ETAP • Interpreting Curves • Coordination Adjustments • Troubleshooting Miscoordination*
0930 – 0945	*Break*
0945 – 1100	***Motor Starting Analysis*** *Types of Motor Starting Methods • Voltage Dip Impact • Dynamic Motor Models • ETAP Motor Starting Module*
1100 – 1215	***Harmonic Analysis*** *Sources of Harmonics • Harmonic Distortion Effects • THD (Total Harmonic Distortion) • Harmonic Filtering Techniques*

1215 – 1230	*Break*
1230 – 1330	***Harmonic Simulation in ETAP*** *Setting Harmonic Sources • Running Harmonic Load Flow • Analyzing Distortion Levels • Mitigation Strategies*
1330 – 1420	***Power Factor Correction*** *Importance of Power Factor • Capacitor Bank Sizing • Impact on System Efficiency • Implementation in ETAP*
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	***Transient Stability Analysis*** *Dynamic System Modeling • Disturbance Simulation • Rotor Angle Stability • ETAP Transient Stability Module*
0830 – 0930	***Dynamic Simulation in ETAP*** *Time-domain Simulation Setup • Event Simulation (Faults, Switching) • Monitoring System Response • Result Interpretation*
0930 – 0945	*Break*
0945 – 1100	***Arc Flash Analysis*** *Arc Flash Hazards • Incident Energy Calculations • NFPA Standards Overview • Arc Flash Labeling*
1100 – 1215	***Arc Flash Simulation in ETAP*** *Setting Up Arc Flash Studies • Running Simulations • Interpreting Results • Safety Compliance*
1215 – 1230	*Break*
1230 – 1330	***Reliability Analysis*** *Reliability Indices (SAIDI, SAIFI) • Failure Rate Modeling • System Availability • Reliability Improvement Strategies*
1330 – 1420	***Contingency Analysis*** *N-1 contingency scenarios • System Response to Outages • Risk Assessment • Preventive Planning*
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*

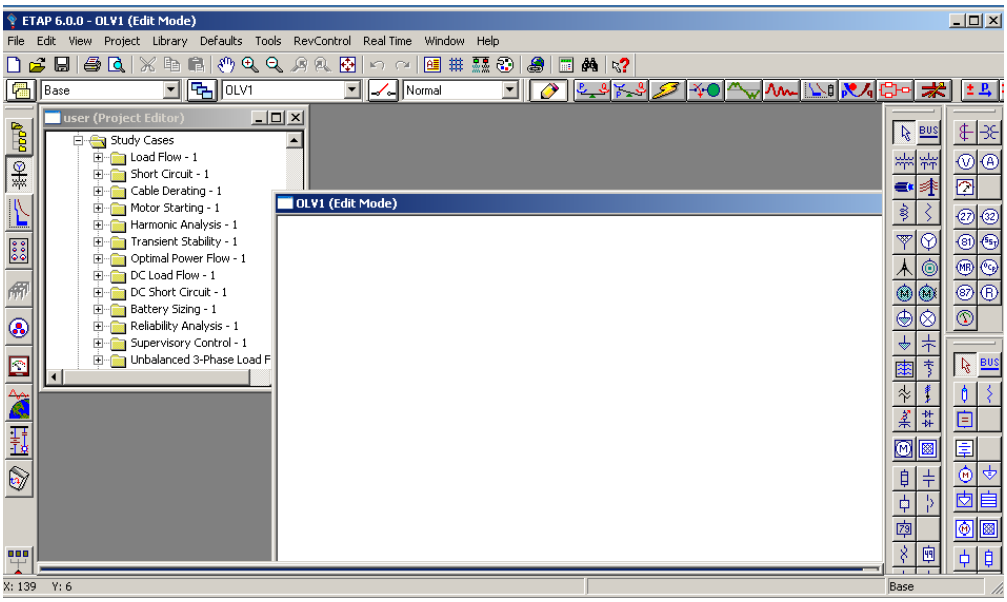
Day 5

0730 – 0830	***Optimal Power Flow (OPF) in ETAP*** *Objective Functions • Constraints in OPF • Economic Dispatch Integration • Optimization Results*
0830 – 0930	***Renewable Energy Integration*** *Modeling Solar and Wind Systems • Intermittency Challenges • Grid Impact Analysis • Hybrid System Modeling*
0930 – 0945	*Break*
0945 – 1100	***Energy Management Systems (EMS)*** *SCADA Integration • Real-Time Monitoring • Data Acquisition • Control Strategies*

1100 – 1215	***Automation & Reporting in ETAP*** *Automated Report Generation • Custom Report Templates • Data Export and Sharing • Documentation Best Practices*
1215 – 1230	*Break*
1230 – 1315	***Case Studies & Industry Applications*** *Industrial Power Systems • Utility-Scale Networks • Troubleshooting Real Systems • Lessons Learned*
1315 - 1345	***Capstone Project & Evaluation*** *Building a Complete ETAP Model • Performing Multiple Analyses • Identifying System Improvements • Presenting Results and Recommendations*
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*

Simulators (Hands-on Practical Sessions)

Practical session 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 the simulator ETAP Software.



ETAP Software Simulator

Course Coordinator

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