COURSE OVERVIEW HE2311
Process Hazard Analysis Methods Mainly HAZOP & LOPA

Course Title
Process Hazard Analysis Methods Mainly HAZOP & LOPA

Course Date/Venue
July 26-30, 2026/TBA Meeting Room, Al Bandar Rotana - Creek, Dubai, UAE

Course Reference
HE2311

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 Process Hazard Analysis Methods Mainly HAZOP and LOPA. It covers the process safety management (PSM), process hazard analysis (PHA) and hazard identification fundamentals; the risk assessment principles, process information requirements for PHA and the purpose and scope of HAZOP and LOPA; the HAZOP methodology and structure and HAZOP team roles and responsibilities; the guide words and process parameters, deviation analysis techniques, HAZOP documentation and reporting; and the risk ranking within HAZOP and safeguard identification and evaluation.

During this interactive course, participants will learn the human factors in HAZOP studies, specialized HAZOP applications and common HAZOP challenges and best practices; the layer of protection analysis (LOPA) and initiating events analysis; the independent protection layers (IPLs), consequence scenarios and risk criteria; the probability of failure on demand (PFD), LOPA calculations and documentation and safety instrumented systems (SIS) fundamentals; the SIL determination using LOPA, advanced LOPA applications and integration of HAZOP and LOPA; and the PHA revalidation and continuous improvement.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on process hazard analysis methods mainly HAZOP and LOPA
- Carryout process safety management (PSM), process hazard analysis (PHA) and hazard identification fundamentals
- Discuss risk assessment principles, process information requirements for PHA and the purpose and scope of HAZOP and LOPA
- Recognize HAZOP methodology and structure, HAZOP team roles and responsibilities and defining nodes and study boundaries
- Identify guide words and process parameters as well as apply deviation analysis techniques, HAZOP documentation and reporting
- Apply risk ranking within HAZOP and safeguard identification and evaluation
- Identify human factors in HAZOP studies, specialized HAZOP applications and common HAZOP challenges and best practices
- Carryout layer of protection analysis (LOPA) and initiating events analysis
- Discuss independent protection layers (IPLs), consequence scenarios and risk criteria as well as probability of failure on demand (PFD)
- Apply LOPA calculations and documentation and discuss safety instrumented systems (SIS) fundamentals
- Carryout SIL determination using LOPA, advanced LOPA applications and integration of HAZOP and LOPA
- Employ PHA revalidation and continuous improvement covering revalidation requirements, tracking action items, lessons learned incorporation and performance monitoring

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 process hazard analysis methods mainly HAZOP and LOPA for risk assessment and risk management professionals, process safety engineers, production supervisors and managers, maintenance engineers and supervisors, HSE personnel 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 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:

Mr. Andrew Ladwig is a **Senior Process & Safety Engineer** with over **25 years** of extensive experience within the **Oil & Gas**, **Refinery**, **Petrochemical & Power** industries. His expertise widely covers in the areas of **PHA**, **HAZOP**, **HAZCOM**, **HAZMAT**, **HAZID**, **LOPA**, **Behavior Based Safety**, **Hazardous Materials & Chemicals** Handling, **Pollution Control**, **Environment, Health & Safety** Management, **Process Risk** Analysis, **Hazard & Risk Assessment**, **Emergency Response Procedures** Behavioural Based Safety (**BBS**), **Confined Space Entry**, **Fall Protection**, **Emergency Response**, H_2S, Safety Management System (**ISO 45001**), **Accident/Incident Investigation** System and Report PSM, **Risk Assessment**, **SCE FMEA Failure Investigations**, Site Management Safety Training (**SMSTS**), **Occupational Health & Safety and Industrial Hygiene, Crisis Management & Damage Control** in Oil & Gas Industry, **Enhancing HSSE Safety Performance & Effectiveness**, **Overhead & Gantry Crane Safety**, **HSSE Principles & Practices Advanced**, **HAZOP** Study, Sampling & Analysis, **Training** Analysis, **Job Analysis** Techniques, Storage & Handling of **Toxic Chemicals & Hazardous Materials**, **Hazardous Material** Classification & Storage/Disposal, **Dangerous Goods**, Environmental Management System (**EMS**). Further, he is also well-versed in **Ammonia Manufacturing & Process Troubleshooting**, **Ammonia Storage & Loading** Systems, **Ammonia Plant** Operation, Troubleshooting & Optimization, **Ammonia Recovery**, **Ammonia Plant Safety**, Hazard of **Ammonia Handling**, Storage & Shipping, **Operational Excellence** in **Ammonia Plants**, **Fertilizer Storage** Management (Ammonia & Urea), **Fertilizer Manufacturing** Process Technology, **Sulphur Recovery**, Phenol Recovery & Extraction, **Wax Sweating & Blending**, **Petrochemical & Fertilizer** Plants, **Nitrogen Fertilizer** Production, **Petroleum Industry Process** Engineering, **Separators** in **Oil & Gas** Industry, **Gas Testing & Energy** Isolations, Gas Liquor Separation, **Industrial Liquid Mixing**, **Wax Bleachers**, **Extractors**, **Fractionation**, Operation & Control of **Distillation**, Process of **Crude ATM & Vacuum Distillation** Unit, **Water Purification**, **Steam & Electricity**, **Flame Arrestors** and **Coal Processing**, **Environmental Emission Control**.

During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer**, **Project Engineer**, **Reliability & Maintenance Engineer**, **Maintenance Support Engineer**, **Process Engineer**, **HSE Supervisor**, **Warehouse Manager**, **Quality Manager**, **Business Analyst**, **Senior Process Controller**, **Process Controller**, **Safety Officer**, **Mechanical Technician**, **Senior Lecturer** and **Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few.

Mr. Ladwig has a **Bachelor's** degree in **Chemical Engineering** and a **Diploma** in **Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and has delivered various trainings, workshops, seminars, courses and conferences internationally.

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.

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 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 workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 26th of July 2026***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Process Safety Management (PSM)*** *Principles of Process Safety • Major Accident Hazards and Consequences • Regulatory and Industry Requirements • Relationship Between PSM and PHA*
0930 – 0945	*Break*
0945 – 1030	***Overview of Process Hazard Analysis (PHA)*** *Definition and Objectives of PHA • Types of PHA Methodologies • Lifecycle Application of PHA • Benefits and Limitations of PHA Studies*
1030 – 1130	***Hazard Identification Fundamentals*** *Hazard Versus Risk Concepts • Sources of Process Hazards • Energy and Chemical Release Scenarios • Incident Causation Models*
1130 – 1215	***Risk Assessment Principles*** *Risk Terminology and Definitions • Consequence Assessment Concepts • Likelihood Estimation Techniques • Risk Matrix Applications*
1215 – 1230	*Break*
1230 – 1330	***Process Information Requirements for PHA*** *Process Flow Diagrams (PFDs) • Piping and Instrumentation Diagrams (P&IDs) • Process Safety Information (PSI) • Operating and Design Parameters*

1330 – 1420	***Basics of HAZOP & LOPA*** *Purpose and Scope of HAZOP • Purpose and Scope of LOPA • Differences Between HAZOP and LOPA • Integration Within the Risk Management Framework*
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: Monday, 27th of July 2026

0730 – 0830	***HAZOP Methodology & Structure*** *History and Development of HAZOP • Systematic Examination Approach • HAZOP Workflow and Process • Applications Across Industries*
0830 – 0930	***HAZOP Team Roles & Responsibilities*** *HAZOP Leader Responsibilities • Team Composition Requirements • Subject Matter Expert Contributions • Documentation and Recording Duties*
0930 – 0945	*Break*
0945 – 1100	***Defining Nodes & Study Boundaries*** *Selection of HAZOP Nodes • Determining Study Scope • Establishing Process Boundaries • Node Segmentation Techniques*
1100 – 1215	***Guide Words & Process Parameters*** *Standard HAZOP Guide Words • Process Parameters Identification • Combining Guide Words and Parameters • Generating Meaningful Deviations*
1215 – 1230	*Break*
1230 – 1330	***Deviation Analysis Techniques*** *Identifying Causes of Deviations • Evaluating Potential Consequences • Reviewing Existing Safeguards • Determining Recommendations*
1330 – 1420	***HAZOP Documentation & Reporting*** *HAZOP Worksheets and Templates • Recording Study Findings • Recommendation Tracking Systems • Final Report Preparation*
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: Tuesday, 28th of July 2026

0730 – 0830	***Risk Ranking within HAZOP*** *Qualitative Risk Assessment • Risk Matrix Utilization • Severity Categorization • Likelihood Estimation Methods*
0830 – 0930	***Safeguard Identification & Evaluation*** *Types of Safeguards • Prevention Versus Mitigation Measures • Human and Administrative Controls • Reliability Considerations*
0930 – 0945	*Break*
0945 – 1100	***Human Factors in HAZOP Studies*** *Human Error Mechanisms • Operator Actions and Responses • Procedural Deficiencies • Ergonomic Considerations*
1100 – 1215	***Specialized HAZOP Applications*** *Batch Process HAZOP • Utility Systems HAZOP • Startup and Shutdown HAZOP • Management of Change (MOC) Reviews*
1215 – 1230	*Break*

1230 – 1330	***Common HAZOP Challenges & Best Practices*** *Avoiding Team Bias • Managing Large Study Scopes • Improving Recommendation Quality • Enhancing Study Efficiency*
1330 – 1420	***Practical HAZOP Workshop*** *Node Selection Exercise • Deviation Generation Practice • Cause-Consequence Analysis • Recommendation Development*
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: ***Wednesday, 29th of July 2026***

0730 – 0830	***Layers of Protection Analysis (LOPA)*** *Purpose and Objectives of LOPA • Semi-Quantitative Risk Assessment • Relationship to HAZOP Findings • LOPA Workflow Overview*
0830 – 0930	***Initiating Events Analysis*** *Definition of Initiating Events • Sources of Initiating Event Data • Frequency Estimation Methods • Data Quality Considerations*
0930 – 0945	*Break*
0945 – 1100	***Independent Protection Layers (IPLs)*** *Definition and Criteria for IPLs • Independence Requirements • Effectiveness and Reliability • Examples of Valid IPLs*
1100 – 1215	***Consequence Scenarios and Risk Criteria*** *Scenario Development Process • Consequence Severity Categories • Risk Tolerance Criteria • Corporate Risk Acceptance Standards*
1215 – 1230	*Break*
1230 – 1330	***Probability of Failure on Demand (PFD)*** *PFD Fundamentals • Assigning PFD Values • Industry Data Sources • Common Calculation Methods*
1330 – 1420	***LOPA Calculations & Documentation*** *Risk Reduction Calculations • Determining Residual Risk • LOPA Worksheets and Forms • Reporting and Documentation Requirements*
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*

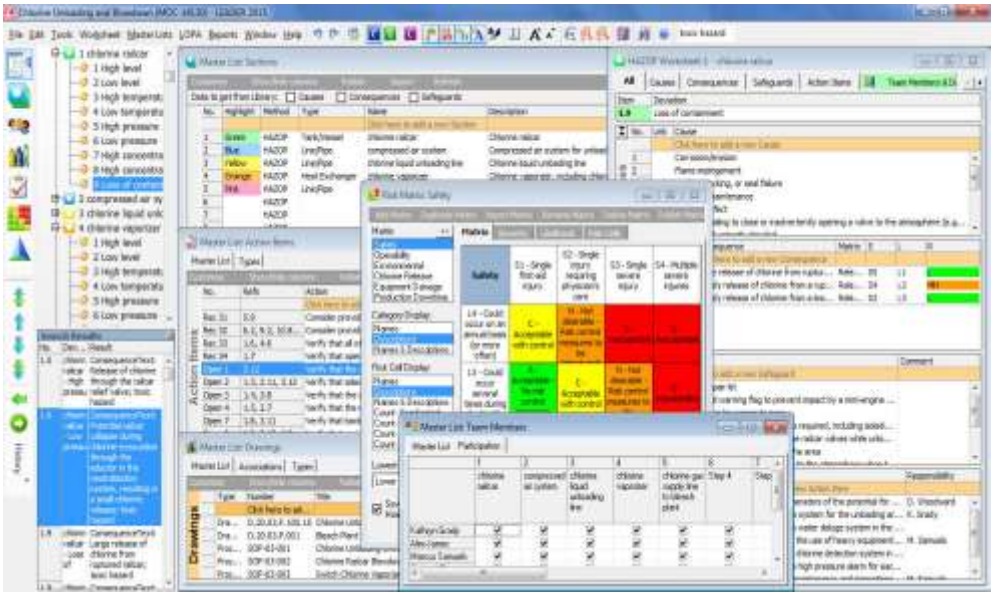
Day 5: ***Thursday, 30th of July 2026***

0730 – 0830	***Safety Instrumented Systems (SIS) Fundamentals*** *SIS Architecture Overview • Safety Instrumented Functions (SIFs) • Risk Reduction Objectives • SIS Lifecycle Concepts*
0830 – 0930	***SIL Determination Using LOPA*** *SIL Concepts and Definitions • Linking LOPA to SIL Selection • Target Risk Reduction Factors • SIL Verification Requirements*
0930 – 0945	*Break*
0945 – 1100	***Advanced LOPA Applications*** *Enabling Conditions • Conditional Modifiers • Multiple Consequence Scenarios • Complex IPL Configurations*

1100 – 1230	***Integration of HAZOP & LOPA*** *Transitioning From HAZOP to LOPA • Selecting Scenarios for LOPA • Managing Recommendations • Maintaining Consistency Between Studies*
1230 – 1245	*Break*
1245 – 1345	***PHA Revalidation & Continuous Improvement*** *Revalidation Requirements • Tracking Action Items • Lessons Learned Incorporation • Performance Monitoring*
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 Haward "PHA/HAZOP" Simulator.



Haward PHA/HAZOP Simulator

Course Coordinator

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