COURSE OVERVIEW FE0928
Metallurgy for Non-Metallurgist

Course Title
Metallurgy for Non-Metallurgist

Course Date/Venue
Please refer to page 3

Course Reference
FE0928

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 learned 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 Metallurgy for Non-Metallurgist. It covers the importance and applications of metallurgy in the petroleum industry; the basic concepts of metals and alloys and the structure of metals; the characteristics of different metal alloy systems like steel, aluminum and copper alloys; the phase diagrams and their significance in understanding material behavior; the basic principles and common phase transformations in metals; the mechanical properties of metals; and testing methods for mechanical properties.

Further, the course will also discuss the factors affecting the selection of materials in engineering applications; the thermal properties, electrical properties and chemical properties of metals; the purpose and importance in altering metal properties; the techniques and methods of heat treatment through annealing, quenching and tempering as well as case hardening; and the effects of heat treatment on microstructure.

During this interactive course, participants will learn the types of corrosion and its significance in the petroleum industry; the mechanisms of corrosion and the factors influencing corrosion; the methods of corrosion testing and corrosion protection; the corrosion behavior of different metals and alloys used in the petroleum industry; the special alloys and their applications; the common causes of metal failure and techniques for failure analysis; the welding and joining of metals as well as non-destructive testing (NDT) methods; and the future trends in metallurgy.

Course Objectives

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

- Apply and gain a comprehensive knowledge on metallurgy for non-metallurgist
- Discuss the importance and applications of metallurgy in the petroleum industry
- Identify the basic concepts of metals and alloys and the structure of metals
- Recognize the characteristics of different metal alloy systems like steel, aluminum and copper alloys
- Understand phase diagrams and their significance in understanding material behavior
- Discuss the basic principles and common phase transformations in metals
- Identify the mechanical properties of metals and apply testing methods for mechanical properties
- Recognize the factors affecting the selection of materials in engineering applications
- Explain thermal properties, electrical properties and chemical properties of metals
- Discuss the purpose and importance in altering metal properties
- Apply proper techniques and methods of heat treatment through annealing, quenching and tempering as well as case hardening
- Understand the effects of heat treatment on microstructure
- Identify the types of corrosion and its significance in the petroleum industry
- Discuss the mechanisms of corrosion and the factors influencing corrosion
- Apply effective methods of corrosion testing and corrosion protection
- Recognize corrosion behavior of different metals and alloys used in the petroleum industry
- Discuss special alloys and their applications as well as the common causes of metal failure and techniques for failure analysis
- Carryout welding techniques and joining of metals as well as non-destructive testing (NDT) methods and discuss future trends in metallurgy

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 metallurgy for those who need a working understanding of metals and their applications. It has been designed for those with no previous training in metallurgy, such as technical, laboratory, and sales personnel; engineers from other disciplines; management and administrative staff; and non-technical support staff such as purchasing and receiving agents who order and inspect incoming material.

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 Date/Venue

Session(s)	Date	Venue
1	September 07-11, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
2	October 06-10, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
3	November 09-13, 2025	Crowne Meeting Room, Crowne Plaza Al Khobar, an IHG Hotel, Al Khobar, KSA
4	December 21-25, 2025	Safir Meeting Room, Divan Istanbul, Taksim, Turkey

Course Fee

Dubai/Abu Dhabi/Al Khobar	**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.
Istanbul	**US$ 6,000** 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 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. George Poulos, MBA, MSc, BSc, CEng, is a **Senior Corrosion & Metallurgical Engineer** with over **30 years** of extensive experience within the **Oil & Gas, Petrochemical, Refinery, Construction, Aircraft & Shipbuilding** Industry. His wide experiences cover in the areas of **Metallurgical** Failure Analysis & Prevention, **Corrosion** Fabrication & Inspection, **Fabrication** & **Repair**, **Corrosion** Prevention, **Corrosion** Engineering, **Corrosion Control**, **Corrosion Inhibition**, **Corrosion** Management in Process Operations, **Corrosion** & Prevention of Failures, **Material** Selection, **Cathodic Protection** Systems, **Steel Metallurgy**, **Steel** Structure Welding, **Steelmaking** Slag, **Steel** Making Application, **Steel Making** Process, **Steel** Manufacturing, **Steel Forging**, **Steel** Manufacturing & Process Troubleshooting, **Hot Rolling** Process, **Hot Strip Mill**, **Mill** Operations, **Roll Mill**, **Electric Arc Furnace** (**EAF**), **Slit Rolling**, **Carbon Steel Pipe** Wall Thickness & Grade Selection, **Ferro-Alloys**, **Heat Treatment** & **Prevention Techniques** and **Post Weld Heat Treatment**. Further, he is also well-versed in **Welding** Inspection, **Welding** & **Machine** Techniques, **TIG** & **Arc Welding**, **Shielded Metal Arc Welding**, **Gas Tungsten** & **Gas Metal Arc Welding**, **Welding** Procedure Specifications & Qualifications, **Aluminium Welding**, **Hot Work-Safety**, **SMAW**, **GTAW**, **Welding** Techniques, **Pipeline Welding** Practices, **Welding** Engineering, **Welding** Fatigue & Fracture Mechanics, **Welding Inspection Technology**, **Welding Safety**, **Welding** Defects Analysis, **Welding Technology**, **Welding Problems**, **Welding & Non Destructive** Testing and **Metallurgy Techniques**.

During his career life, Mr. Poulos has gained his practical and field experience through his various significant positions and dedication as the **Chief Executive**, **Head of Technical Studies**, **Manager**, **Senior Consultant**, **Lead Welding Engineer**, **Senior Welding Engineer**, **Design Engineer**, **Sales Engineer**, **Author**, **Welding Instructor**, **Visiting Lecturer** and **Technical Proposal Research Evaluator** from various international companies such as Greek Welding Institute, Hellenic Quality Forum and International Construction Companies such as Shipbuilding, Aircraft Industry and Oil and Gas Industry.

Mr. Poulos is a **Registered Chartered Engineer** and has a **Master's** degree in **Naval Architecture**, a **Bachelor's** degree in **Welding Engineering** and a Master of Business Administration (**MBA**) from the **Sunderland University**, **Aston University** and **Open University**, **UK**, respectively. Further, he is a **Certified Trainer/Instructor**, an active Member of Chartered Quality Institute (**CQI**), The British Welding Institute (**TWI**), The Royal Institution of Naval Architects (**RINA**) and American Welding Society (**AWS**), a Registered **EWF/IW** (European Welding Federation-International Welding Institute W/E) and an **IRCA** Accredited External Quality Systems Auditor through BVQI. He is an **Author** of Technical Book dealing with Protection/Health/Safety in the Welding/Cutting domain and delivered various trainings, seminars, conferences, workshops and courses globally.

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 – 0815	*Registration & Coffee*
0815 – 0830	*Welcome & Introduction*
0830 – 0845	***PRE-TEST***
0845 – 0915	***Overview of Metallurgy:*** *Definition, Importance and Applications in the Petroleum Industry*
0915 – 0935	*Break*
0935 – 1030	***Basic Concepts of Metals & Alloys****: Definition, Types and Classification of Metals and Alloys*
1030 – 1100	***The Structure of Metals****: Crystalline Structures, Grains, and Grain Boundaries*
1100 – 1215	***Characteristics of Different Metal Alloy Systems****: Properties and Uses of Common Alloys such as Steel, Aluminum and Copper Alloys*
1215 – 1230	*Break*
1230 – 1300	***Phase Diagrams - Fundamentals****: Introduction to Phase Diagrams and their Significance in Understanding Material Behavior*
1300 – 1420	***Phase Transformations****: Basic Principles and Common Phase Transformations in Metals*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0845	***Mechanical Properties of Metals****: Strength, Ductility, Hardness, Toughness and Fatigue*
0845 – 0915	***Testing Methods for Mechanical Properties****: Tensile Test, Hardness Test, Impact Test and Fatigue Test*
0915 – 0930	*Break*
0935– 1100	***Material Selection Criteria****: Factors Affecting the Selection of Materials in Engineering Applications*
1100 – 1215	***Thermal Properties****: Conductivity, Expansion and Heat Capacity of Metals*
1215 – 1230	*Break*
1230 – 1300	***Electrical Properties****: Conductivity, Resistivity and Applications in the Petroleum Industry*
1300 – 1420	***Chemical Properties****: Reactivity, Corrosion Resistance and Chemical Stability*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0845	***Heat Treatment****: Purpose and Importance in Altering Metal Properties*
0845 – 0915	***Annealing****: Process, Purpose and Effects on Metal Properties*
0915 – 0930	*Break*
0930 – 1100	***Quenching & Tempering****: Techniques, Applications and Effects on Mechanical Properties*
1100 – 1215	***Case Hardening****: Methods such as Carburizing and Nitriding*

1215 – 1230	Break
1230 – 1300	***Effects of Heat Treatment on Microstructure***: Changes in Grain Size, Phase Distribution and Mechanical Properties
1300 – 1420	***Practical Applications of Heat Treatment in the Petroleum Industry***: Case Studies and Examples
1420 – 1430	***Recap***
1430	Lunch & End of Day Three

Day 4

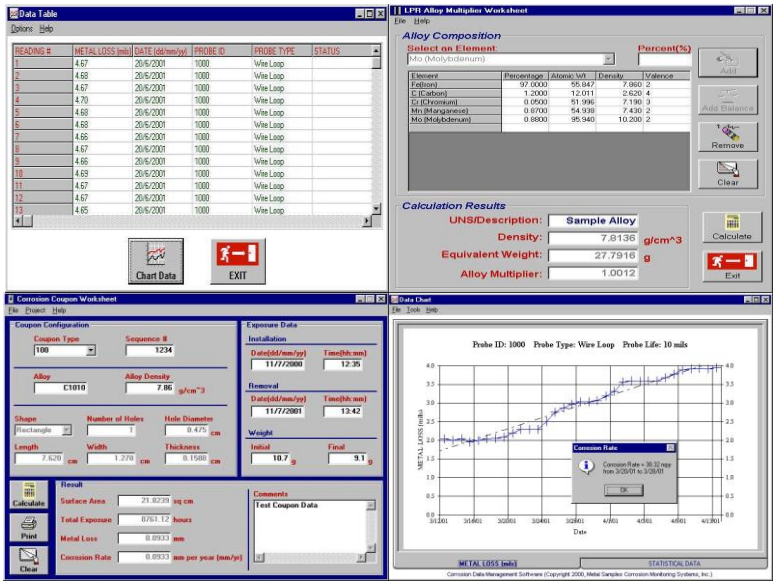
0730 – 0845	***Corrosion & Its Prevention***: Definition, Types and Significance in the Petroleum Industry
0845 – 0915	***Mechanisms of Corrosion***: Electrochemical Principles and Various Forms of Corrosion such as Uniform, Pitting and Galvanic Corrosion
0915 – 0930	Break
0930 – 1100	***Factors Influencing Corrosion***: Environmental Factors, Material Properties and Operational Conditions
1100 – 1215	***Corrosion Testing Methods***: Techniques to Evaluate Corrosion Resistance and Rate
1215 – 1230	Break
1225 – 1300	***Corrosion Protection Methods***: Coatings, Cathodic Protection and Material Selection
1300 – 1420	***Comparative Corrosive Potential of Metals***: Corrosion Behavior of Different Metals and Alloys Used in the Petroleum Industry
1420 – 1430	***Recap***
1430	Lunch & End of Day Four

Day 5

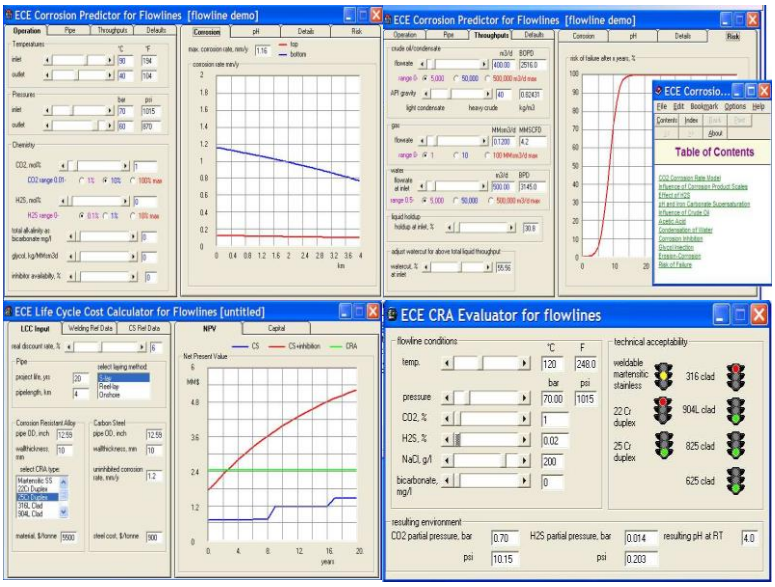
0730 – 0845	***Special Alloys & Their Applications***: Overview of Superalloys, Titanium Alloys and their Use in Extreme Environments
0845 – 0915	***Failure Analysis***: Common Causes of Metal Failure and Techniques for Failure Analysis
0915 – 0930	Break
0935 – 1100	***Welding & Joining of Metals***: Welding Techniques, Challenges and Metallurgical Considerations
1100 – 1215	***Non-Destructive Testing (NDT) Methods***: Techniques such as Ultrasonic Testing, Radiography and Magnetic Particle Inspection
1215 – 1230	Break
1230 – 1300	***Future Trends in Metallurgy***: Emerging Materials, Nanomaterials and Advanced Manufacturing Techniques
1300 - 1400	***Case Studies & Real-World Applications***: Discussion of Real-World Examples and Best Practices in Metallurgy within the Petroleum Industry
1400 – 1415	***Course Conclusion***
1415 - 1430	***POST-TEST***
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 the simulators "Corrosion Data Management Software (CDMS)" and "Electronic Corrosion Engineer (ECE®) 5".



Corrosion Data Management Software (CDMS)



Electronic Corrosion Engineer (ECE®) 5

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org