

COURSE OVERVIEW DE0539
Geochemistry

Course Title
 Geochemistry

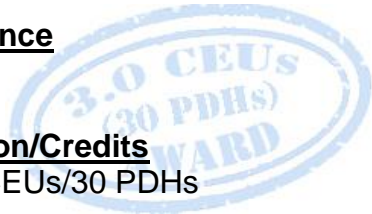
Course Date/Venue
 Session 1: April 20-24, 2025/Boardroom 1,
 Elite Byblos Hotel Al Barsha,
 Sheikh Zayed Road, Dubai, UAE
 Session 2: September 08-12, 2025/Fujairah
 Meeting Room, Grand Millennium
 Al Wahda Hotel, Abu Dhabi, UAE



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 INCLUDED**

Course Reference
 DE0539

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



Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.



This course is designed to provide participants with a detailed and up-to-date overview of Geochemistry. It covers the applications of geochemistry in environmental and planetary science; the earth's composition and periodic table in geochemistry; the isotopes and geochemistry; the chemical bonding and mineral stability; the analytical methods in geochemistry, carbon cycle, nitrogen and sulfur cycles; and the thermodynamics in geochemistry, geochemical kinetics, aqueous geochemistry and geochemical modelling.



During this interactive course, participants will learn the mineral chemistry and igneous, sedimentary & metamorphic geochemistry; the geochemistry of hydrothermal systems, geochemical tracers in petrology and environmental geochemistry; the geochemistry of the atmosphere, water resources, resource exploration and forensic geochemistry; the geochemistry and climate change, isotope geochemistry, geochemistry of planetary bodies and organic geochemistry; and the geochemical hazards, big data in geochemistry and future directions in geochemistry.

Course Objectives

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

- Apply and gain an in-depth knowledge on geochemistry
- Discuss the basics of geochemistry and its applications in environmental and planetary science
- Describe earth's composition and the periodic table in geochemistry
- Recognize isotopes and geochemistry as well as the chemical bonding and mineral stability
- Carryout analytical methods in geochemistry and illustrate carbon cycle, nitrogen and sulfur cycles
- Discuss thermodynamics in geochemistry, geochemical kinetics, aqueous geochemistry and geochemical modelling
- Determine mineral chemistry, igneous geochemistry, sedimentary geochemistry and metamorphic geochemistry
- Explain geochemistry of hydrothermal systems, geochemical tracers in petrology and environmental geochemistry
- Interpret geochemistry of the atmosphere, geochemistry of water resources, applied geochemistry in resource exploration and forensic geochemistry
- Discuss geochemistry and climate change, isotope geochemistry, geochemistry of planetary bodies and organic geochemistry
- Recognize geochemical hazards, big data in geochemistry and future directions in geochemistry

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 geochemistry for geochemists, environmental scientists/engineers, geologists, mineral exploration teams, petroleum and natural gas engineers, hydrologists, analytical chemists, mining engineers, climate scientists, ecologists and agricultural scientists.

Course Fee


US\$ 8,000 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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: -

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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.

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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. Saber Hussein is a **Senior Geophysicist** with **over 30 years** of extensive experience within the **Oil, Gas** and **Petrochemical** Industries. His specialization widely covers in the areas of **Basic Geology, Correlation Methods, Coring & Core Analysis, Core Handling, Overburden Effects, Conventional Data, Archie Equations, Mercury Injection, Rock Mechanics, Petrophysical Techniques, Geological, Geophysical & Petrophysical Evaluations, Stratigraphy & Sedimentology, Subsurface Maps, Geological Cross-Sections, Drilling Fluids, Drilling Data Analysis, Mud Logging, Porosity, Permeability, Basin Analysis, Reservoir Characterization, Facies Analysis & Sequence Stratigraphy, Structural Geology, Wellsite, Slick Line Operation and Fracture Characterization**. Further, he is also well-versed in rock properties, seismic analysis, petroleum risk and decision, play analysis and risk assessment. Currently, he is the **Exploration Division General Manager** and **Board Member** of one of the leading Petrochemical Plant in the Middle East.

During his career life, Mr. Saber has gained his practical and field experience through his various significant position and dedication as the **Exploration Division General Manager, General Manager, Senior Geophysicist, Geophysicist, Expert Mud Logging Assistant** and **Geologist**. He is also a **Board Member** of **SUCO Strategy Plan Committee**, wherein he was responsible for supervision of **all Geological, Geophysical** and **Petro physical Operation activities** as well as **Data Processing** and supervising all activities pertaining to the software and hardware of work station.

Mr. Saber has a **Bachelor's** degree in **Geology**. Further, he is a **Certified Instructor/Trainer** and an active member of Egyptian Petroleum Exploration Society (**EPEX**), American Association of Petroleum Geologists (**AAPG**), GSE and the Petroleum and Scientific Professional Syndicate. He has further delivered numerous trainings, courses, seminars 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.

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	Basics of Geochemistry Definition & Scope of Geochemistry • Historical Development of Geochemistry • Role of Geochemistry in Earth Sciences • Applications in Environmental & Planetary Science
0930 – 0945	Break
0945 – 1030	Earth's Composition Distribution of Elements in The Earth (Core, Mantle, Crust) • Abundance of Major & Trace Elements • Composition of The Lithosphere, Hydrosphere, & Atmosphere • Elemental Cycles
1030 – 1100	The Periodic Table in Geochemistry Chemical Behavior of Elements • Goldschmidt's Classification of Elements • Lithophile, Siderophile, Chalcophile, & Atmophile Elements • Geochemical Significance of Transition Metals
1100 – 1230	Isotopes & Geochemistry Stable versus Radiogenic Isotopes • Isotope Fractionation Processes • Applications of Isotopes in Geochemistry • Radioactive Decay Systems & Geochronology
1230 – 1245	Break
1245 – 1330	Chemical Bonding & Mineral Stability Types of Chemical Bonds (Ionic, Covalent, Metallic, & Van Der Waals) • Role of Bonding in Mineral Formation • Stability & Crystallization of Minerals • Phase Diagrams & Phase Transitions
1330 – 1420	Analytical Methods in Geochemistry X-Ray Fluorescence (XRF) • Inductively Coupled Plasma Mass Spectrometry (ICP-MS) • Scanning Electron Microscopy (SEM) • Overview of Precision & Accuracy in Geochemical Analysis
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	The Carbon Cycle Carbon Reservoirs & Fluxes • Role of Carbon in Climate Regulation • Carbon Isotopes & Their Significance • Anthropogenic Impacts on The Carbon Cycle
0830 – 0930	The Nitrogen & Sulfur Cycles Key Processes in The Nitrogen Cycle (Nitrification, Denitrification, etc.) • Sulfur Reservoirs & Transformations • Biogeochemical Cycling of Nitrogen & Sulfur • Environmental Implications (e.g., Acid Rain)
0930 – 0945	Break

0945 – 1100	Thermodynamics in Geochemistry Basic Principles (Enthalpy, Entropy, Gibbs Free Energy) • Chemical Equilibrium & Phase Stability • Temperature-Pressure Conditions in Geochemical Reactions • Applications of Thermodynamics in Metamorphism
1100 – 1230	Geochemical Kinetics Reaction Rates in Geochemical Systems • Factors Affecting Reaction Rates (Temperature, Pressure, Catalysts) • Dissolution & Precipitation of Minerals • Applications in Weathering & Diagenesis
1230 – 1245	Break
1230 – 1330	Aqueous Geochemistry Properties of Water as a Geochemical Solvent • Solubility & Speciation of Elements in Water • Acid-Base Equilibria in Natural Waters • Redox Reactions in Aqueous Systems
1330 – 1420	Geochemical Modeling Introduction to Geochemical Modeling Software (e.g., PHREEQC, Geochemist's Workbench) • Speciation & Solubility Modeling • Simulation of Water-Rock Interactions • Applications in Hydrogeology & Environmental Geochemistry
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	Mineral Chemistry Major & Trace Element Compositions of Minerals • Crystal Chemistry & Element Substitution • Geochemical Classification of Minerals • Role of Mineral Chemistry in Petrogenesis
0830 – 0930	Igneous Geochemistry Magma Generation & Evolution • Major & Trace Elements in Igneous Rocks • Geochemical Classification of Igneous Rocks • Fractional Crystallization & Magma Mixing
0930 – 0945	Break
0945 – 1100	Sedimentary Geochemistry Chemical Weathering & Soil Formation • Major & Trace Element Composition of Sediments • Role of Organic Matter in Sedimentary Geochemistry • Diagenetic Processes & Sedimentary Rock Formation
1100 – 1230	Metamorphic Geochemistry Chemical Changes During Metamorphism • Role of Fluids in Metamorphism • Element Mobility & Metamorphic Reactions • Geochemical Signatures of Metamorphic Rocks
1230 – 1245	Break

1245 – 1330	Geochemistry of Hydrothermal Systems <i>Fluid-Rock Interactions in Hydrothermal Systems • Geochemical Processes in Ore Formation • Trace Element Mobility in Hydrothermal Systems • Case Studies of Hydrothermal Deposits</i>
1330 – 1420	Geochemical Tracers in Petrology <i>Rare Earth Elements (Rees) in Rocks & Minerals • Geochemical Fractionation Processes • Isotopic Tracers in Igneous & Metamorphic Systems • Applications in Reconstructing Geological Processes</i>
1420 – 1430	Recap <i>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</i>
1430	Lunch & End of Day Three

Day 4

0730 – 0830	Environmental Geochemistry <i>Geochemistry of Soils & Sediments • Pollution Geochemistry (Heavy Metals, Contaminants) • Geochemical Monitoring of Ecosystems • Case Studies: Acid Mine Drainage, Contaminated Groundwater</i>
0830 – 0930	Geochemistry of the Atmosphere <i>Composition of Atmospheric Gases • Isotopes in Atmospheric Studies (e.g., Oxygen & Carbon Isotopes) • Human Impact on Atmospheric Chemistry • Role of Aerosols in Climate & Geochemistry</i>
0930 – 0945	Break
0945 – 1100	Geochemistry of Water Resources <i>Groundwater Geochemistry • Geochemical Processes in Rivers & Lakes • Ocean Chemistry & Its Regulation • Water Contamination & Remediation Techniques</i>
1100 – 1230	Applied Geochemistry in Resource Exploration <i>Geochemical Prospecting Methods • Pathfinders for Ore Deposits • Geochemistry in Petroleum Exploration • Applications in Geothermal Energy Exploration</i>
1230 – 1245	Break
1245 – 1330	Forensic Geochemistry <i>Applications in Environmental Forensics • Fingerprinting of Pollution Sources • Isotopic Analysis in Forensic Investigations • Case Studies: Oil Spills, Mining Impacts</i>
1330 – 1420	Geochemistry & Climate Change <i>Role of Geochemistry in Studying Past Climates • Geochemical Proxies in Paleoclimatology • Ocean Acidification & Carbonate Chemistry • Geoengineering & Carbon Sequestration</i>
1420 – 1430	Recap <i>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</i>
1430	Lunch & End of Day Four



Day 5

0730 – 0830	Isotope Geochemistry: Advanced Applications Radiogenic Isotopes in Dating Rocks (U-Pb, K-Ar, Rb-Sr Systems) • Stable Isotopes in Environmental Studies • Non-Traditional Isotopes (e.g., Lithium, Iron) • Isotopes in Extraterrestrial Studies
0830 – 0930	Geochemistry of Planetary Bodies Composition of Meteorites & Planetary Materials • Lunar & Martian Geochemistry • Geochemical Implications of Space Exploration • Planetary Differentiation Processes
0930 – 0945	Break
0945 – 1100	Organic Geochemistry Chemistry of Organic Matter in Sediments • Biomarkers & Molecular Fossils • Organic Matter Diagenesis & Petroleum Generation • Applications in Environmental & Energy Geochemistry
1100 – 1230	Geochemical Hazards Arsenic & Fluoride Contamination in Groundwater • Natural Radioactivity & Radon Geochemistry • Volcanic Gas Geochemistry & Hazards • Risk Assessment & Mitigation Strategies
1230 – 1245	Break
1245 – 1330	Big Data in Geochemistry Role of Machine Learning in Geochemical Research • Data Analytics for Large-Scale Geochemical Datasets • Applications in Predictive Modeling • Integration of Geochemical Databases
1330 – 1345	Future Directions in Geochemistry Geochemistry in The Anthropocene • Role of Geochemistry in Sustainability & Green Technologies • Emerging Tools & Techniques (e.g., Nanoscale Analysis) • Collaborative Research in Global Geochemical Cycles
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

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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