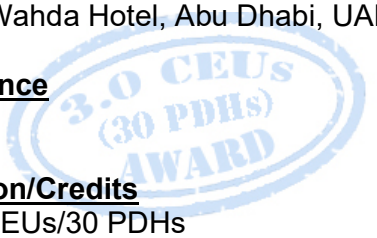
COURSE OVERVIEW DE0041
Saturation-Height Modelling for Reservoir Description

Course Title
Saturation-Height Modelling for Reservoir Description

Course Date/Venue
Session 1: January 26-30, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: July 28-August 01, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE



Course Reference
DE0041

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 capillary pressure, saturation height function and rock fluids proprieties. It covers the capillarity in rocks, saturation-height planning, sample preparation and selection and principle test methods; the sample screening, preparation and selection; the wettability conditioning, wettability tests and overburden stress estimation; the sample characterization and base measurements; and the porosity measurement, QV and CEU measurement method and quality control.

During this interactive course, participants will learn the porosity and permeability at stress, mercury injection, centrifuge and porous plate; the representative sampling, correction for unrepresentative sampling and weighting factors for model fitting; the data collection and formatting; the corrections and conversions; the model input data quality control, irreducible water saturation and saturation-height model creation and quality control; and the imbibition modelling, reconciliation with log data and implementation in reservoir modelling.

Course Objectives

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

- Apply and gain an in-depth knowledge on capillary pressure, saturation height function and rock fluids proprieties
- Discuss capillarity in rocks and carryout saturation-height planning, sample preparation and selection and principle test methods
- Employ sample screening, preparation and selection including wettability conditioning, wettability tests and overburden stress estimation
- Apply sample characterization and base measurements, porosity measurement, Qv and CEU measurement method and quality control
- Discuss porosity and permeability at stress, mercury injection, centrifuge and porous plate
- Test representative sampling, correct for unrepresentative sampling and determine weighting factors for model fitting
- Illustrate data collection and formatting and discuss corrections and conversions
- Carryout model input data quality control, irreducible water saturation and saturation-height model creation and quality control
- Illustrate imbibition modelling, reconciliation with log data and implementation in reservoir modelling

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 capillary pressure, saturation height function and rock fluids proprieties for petrophysicists, geologists, geophysicists, reservoir and production engineers and those who are involved information evaluation and/or reservoir modelling.

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 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 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 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. Chris Kapetan, PhD, MSc, is a **Senior Drilling & Petroleum Engineer** with over **40 years** of international experience within the **onshore** and **offshore oil** & **gas** industry. His wide experience covers **Horizontal & Multilateral Wells**, **Well Completion & Stimulation**, **Artificial Lift System Selection & Design**, **Drilling Practices**, **Drilling Fluids Technology**, Drilling **Operations**, **Directional** Drilling**, Formation Damage** Evaluation & Preventive, **Formation Damage** Remediation, **Drilling & Formation Damage**, Simulation Program for The **International Petroleum Business**, **Well** Testing & Analysis, **Well** Design, **Well** Testing & Oil Well Performance, **Well** Test Design Analysis, **Well Test** Operations, **Well Testing & Perforation**, Root Cause Analysis (**RCA**), RCA Method for Process Plant, **RCA** Techniques, Control Well-Flow Lines Parameters, Decision Analytic Modelling Methods for **Economic Evaluation**, **Probabilistic Risk Analysis** (**Monte Carlo Simulator**) **Risk Analysis** Foundations, Sulphur, Sour Natural Gas, **Natural Gas Sweeting**, **Petroleum Production**, Field Layout, **Production** Techniques & Control, **Surface Production** Operations, **Project Risk Analysis**, **Feasibility Analysis** Techniques, **Capital Operational Costs**, **Flowmetering & Custody Transfer** and **Oil Refinery**. Further, he is also well-versed in Enhanced Oil Recovery (**EOR**), Electrical Submersible Pumps (**ESP**), **Oil Industries Orientation**, **Geophysics**, **Cased Hole** Formation Evaluation, **Cased Hole** Applications, **Cased Hole** Logs, **Production Wells** Operations, **Production** Management, **Perforating** Methods & Design, **Perforating** Operations, **Fishing** Operations, **Well & Reservoir** Testing, **Reservoir** Stimulation, **Hydraulic Fracturing**, **Carbonate** Acidizing, **Sandstone** Acidizing, **Drilling Fluids** Technology, Drilling Operations, **Directional** Drilling, **Artificial Lift**, **Gas Lift Design**, **Gas Lift** Operations, Petroleum Business, **Petroleum Economics**, Field Development Planning, **Gas Lift Valve** Changing & Installation, **Well Completion** Design & Operation, **Well** Surveillance, **Well** Testing, **Well** Stimulation & Control and **Workover** Planning, Completions & Workover, **Rig Sizing**, **Hole Cleaning & Logging**, **Well Completion**, **Servicing & Work-Over** Operations, Practical **Reservoir Engineering**, **X-mas Tree & Wellhead** Operations, Maintenance & Testing, Advanced **Petrophysics/Interpretation** of **Well Composite**, **Construction Integrity** & **Completion**, **Coiled Tubing** Technology, **Corrosion Control**, **Slickline**, **Wireline & Coil Tubing**, **Pipeline Pigging**, **Corrosion** Monitoring, **Cathodic Protection** as well as Root Cause Analysis (**RCA**), Root Cause Failure Analysis (**RCFA**), **Gas Conditioning & Process Technology**, **Production Safety** and **Delusion of Asphalt**. Currently, he is the **Operations Consultant** & the **Technical Advisor** at **GEOTECH** and an independent **Drilling Operations Consultant** of various engineering services providers to the international clients as he offers his expertise in many areas of the **drilling & petroleum discipline** and is well **recognized & respected** for his process and procedural expertise as well as ongoing participation, interest and experience in continuing to promote technology to producers around the world.

Throughout his long career life, Dr. Chris has worked for many international companies and has spent several years **managing** technically **complex wellbore interventions** in both **drilling** & **servicing**. He is a **well-regarded** for his **process** and **procedural expertise**. Further, he was the **Operations Manager** at **ETP Crude Oil Pipeline Services** where he was fully responsible for optimum operations of crude oil pipeline, **workover** and **directional drilling**, **drilling rigs** and equipment, drilling of various geothermal deep wells and **exploration wells**. Dr. Chris was the **Drilling** & **Workover Manager** & **Superintendent** for **Kavala Oil** wherein he was responsible for supervision of **drilling** operations and **offshore exploration**, quality control of performance of **rigs**, **coiled tubing**, **crude oil** transportation via pipeline and abandonment of **well** as per the API requirements. He had occupied various key positions as the **Drilling Operations Consultant**, **Site Manager**, **Branch Manager**, **Senior Drilling** & **Workover Manager** & **Engineer**, **Drilling** & **Workover Engineer**, **Process Engineer**, **Operations Consultant** and **Technical Advisor** in several petroleum companies responsible mainly on an **offshore** sour oil field (under water flood and gas lift) and a gas field. Further, Dr. Chris has been a **Professor** of the **Oil Technology College**.

Dr. Chris has **PhD** in **Reservoir Engineering** and a **Master's** degree in **Drilling & Production Engineering** from the **Petrol-Gaze Din Ploiesti University**. Further, he is a **Certified Surfaced BOP Stack Supervisor** of **IWCF**, a **Certified Instructor/Trainer**, a **Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management** (**ILM**) and has conducted numerous short courses, seminars and workshops and has published several technical books on **Production Logging**, **Safety Drilling Rigs** and **Oil Reservoir**.

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	***Introduction-Capillarity in Rocks*** *Lithology ● Total & Effective Porosity Concepts ● Cay Bound Water & Qv ● Permeability ● Capillary Basic Forces ● Relative Permeability ● Fluid Contacts ● Drainage & Imbibition, Basic Formulae*
0930 – 0945	*Break*
0945 – 1100	***Saturation-Height Planning*** *Sample Preparation & Selection ● Principal Test Methods ● Outline of QC Concepts ● Saturation-Height Function Selection ● Workflow*
1100 – 1230	***Sample Screening, Preparation & Selection*** *Core Samples ● Wettability & Wettability Conditioning ● Sample Screening ● Test Fluid Preparation & Characterization ● Sample Preparation ● Wettability Tests ● Overburden Stress Estimation*
1230 – 1245	*Break*
1245 – 1420	***Sample Characterization & Base Measurements*** *Porosity Measurement ● Brine Saturation Porosity ● Gas Permeability & Klinkenberg Correction ● Qv & CEC Measurement Methods & Quality Control, SEM,XRD*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Porosity & Permeability at Stress*** *Porosity Data Sources ● Porosity Stress Compaction Factor Calculation, Permeability Data Sources ● Permeability Data Sources ● Permeability Stress Correction Factor Calculation*
0930 – 0945	*Break*
0945 – 1100	***Mercury Injection*** *Low Pressure & High Pressure Systems ● Procedures for Primary Drainage ● Saturation Determination & Calculation ● Pros & Cons ● Quality Control Issues & Diagnostics ● System & Conformance Corrections ● Pore Throat Size Distribution Calculations ● Spontaneous Imbibition*
1100 – 1230	***Centrifuge*** *Equipment & Set Up ● Fluid Selection ● Test Procedures ● Capillary Pressure Calculation & Selection ● Saturation Calculations ● Understanding Lab Data & Reports ● Pros & Cons ● Quality Control Issues & Diagnostics ● Imbibition Tests ● Forced Imbibition*

1230 – 1245	*Break*
1245 – 1420	***Porous Plate*** *Equipment & Set Up ● Fluid Selection, Test Procedures, Capillary Pressure Selection ● Saturation Determination & Calculation ● Understanding Lab Data & Reports ● Pros & Cons ● Quality Control Issues & Diagnostics ● Imbibition Tests.*
1420 – 1430	***Recap***
1430	*Lunch &End of Day Two*

Day 3

0730 – 0930	***Representative Data*** *Testing for Representative Sampling ● Correcting for Unrepresentative Sampling ● Determining Weighting Factors for Model Fitting*
0930 – 0945	*Break*
0945 – 1100	***Data Collation & Formatting*** *Which Data to Extract from Core Reports ● Data Formats to Facilitate Workflows*
1100 – 1230	***Corrections & Conversions*** *Closure or Conformance (Mercury Injection) ● Clay Bound Water (Mercury Injection) ● Stress ● Impact of Corrections ● Converting Fluid Systems ● Pressure to Height Conversion ● Combined Fluid & Pressure to Height Conversion*
1230 – 1245	*Break*
1245 – 1420	***Model Input Data Quality Control*** *Comparing Different Measurement Types ● Quality Control of Baseline Datasets*
1420 – 1430	***Recap***
1430	*Lunch &End of Day Three*

Day 4

0730 – 0930	***Irreducible Water Saturation*** *Sw vs. Porosity ● Sw vs. Permeability ● Uncertainty Quantification*
0930 – 0945	*Break*
0945 – 1100	***Saturation-Height Model Creation & Quality Control*** *Which Models to Choose & Why ● Model Fitting ● Individual Curve Correlation Method ● All Data Simultaneously Using Excel Solver ● Sub-Groupings ● Uncertainty Quantification ● Checking for "Good Behaviour"*
1100 – 1230	***Imbibition Modelling*** *Column Previously at Irreducible Sw ● Column Previously in Transition Zone &/or Irreducible Sw ● Examples of Imbibition Modelling ● Volumetric Impact of Imbibition vs. Drainage*
1230 – 1245	*Break*
1245 – 1420	***Reconciliation with Log Data*** *The Importance of Permeability ● Reconciliation with Log Evaluation ●What is an Acceptable Match ● Example Matches & Comments ● Saturation-Height Functions from Logs*
1420 – 1430	***Recap***
1430	*Lunch &End of Day Four*

Day 5

0730 – 0930	***Special Situations*** *Perched Contacts ● Dual (or More) Porosity Systems ● Oil or Mixed-Wet Systems ● Gas-Oil-Water Systems*
0930 – 0945	*Break*
0945 – 1100	***Implementation in Reservoir Modelling*** *Practical Implementation ● The Effect of Scale on Saturation-Height ● Porosity-to-Permeability Transforms*
1100 – 1230	***Implementation in Reservoir Modelling (cont'd)*** *Water Saturation Averaging ● Implementation in Static Models ● Implementation in Dynamic Models*
1230 – 1245	*Break*
1245 – 1345	***Additional Uses*** *Identifying Reservoir & Seals, Current & Original FWL Location ● Thin Beds ● Dodgy or Missing Resistivity Logs ● Pore Throat Size Distributions ● Permeability Prediction*
1345 – 1400	***Course Conclusion***
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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