COURSE OVERVIEW DE0395
Rock Physics – Integrating Petrophysical, Geomechanical & Seismic Measurements

Course Title
Rock Physics – Integrating Petrophysical, Geomechanical & Seismic Measurements

Course Reference
DE0395

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

Course Date/Venue

Session(s)	Date	Venue
1	February 18-22, 2024	Oryx Meeting Room, DoubleTree By Hilton Doha-Al Sadd, Doha, Qatar
2	May 26-30, 2024	
3	October 13-17, 2024	
4	December 22-26, 2024	

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 Integrating Petrophysical, Geomechanical & Seismic Measurements of Rock Physics. It covers the importance of rock physics in oil and gas exploration and production; the basic principles of rock physics; the rock types and textures, petrophysical properties of rocks and elastic properties of rocks; the laboratory measurement techniques, well log interpretation, petrophysical evaluation of reservoirs and fluid substitution analysis; and the impact of rock water on petrophysical properties.

Further, the course will also discuss the importance on capillary pressure and relative permeability in rock physics; the principle of geomechanics, in-situ stress and strain analysis and rock mechanical properties and their measurement; the wellbore stability and sand production; and the fracture mechanics in rock physics and seismic wave propagation in rocks.

During this interactive course, participants will learn the amplitude versus offset (AVO) and inversion techniques; the rock physics templates (RPTs) and 4D seismic and rock physics; the rock physics modeling and simulation; integrating petrophysical, geomechanical and seismic data; the uncertainty analysis in rock physics and the emerging technologies in rock; and the application in unconventional reservoirs.

Course Objectives

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

- Apply and gain an in-depth knowledge on integration of petrophysical, geomechanical and seismic measurements in rock physics
- Discuss the importance of rock physics in oil and gas exploration and production including the basic principles of rock physics
- Identify the rock types and textures, petrophysical properties of rocks and elastic properties of rocks
- Carryout laboratory measurement techniques, well log interpretation, petrophysical evaluation of reservoirs and fluid substitution analysis
- Describe the impact of rock water on petrophysical properties and its importance of capillary pressure and relative permeability in rock physics
- Discuss the principle of geomechanics, apply in-situ stress and strain analysis and recognize rock mechanical properties and their measurement
- Carryout wellbore stability and sand production and describe the fracture mechanics in rock physics, seismic wave propagation in rocks and seismic attributes and rock physics
- Carryout amplitude versus offset (AVO) and inversion techniques and discuss rock physics templates (RPTs) and 4D seismic and rock physics
- Illustrate rock physics modeling and simulation and integrate petrophysical, geomechanical and seismic data
- Carryout uncertainty analysis in rock physics and recognize the emerging technologies in rock physics as well as the application in unconventional reservoirs

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 integrating petrophysical, geomechanical and seismic measurements in rock physics for geoscientists, petrophysicists, seismic interpreters, reservoir engineers, geomechanical engineers, exploration and production managers and other technical staff.

Course Fee

US$ 8,500 per Delegate. 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

Certificates are accredited by the following international accreditation organizations: -

- 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.

- 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.

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. Stan Constantino, MSc, BSc, is a **Senior Petroleum & Reservoir Engineer** with over **40 years** of **Offshore & Onshore** extensive experience within the **Oil**, **Gas & Petroleum** industries**.** His area of expertise include **Cased Hole Logging**, Advanced Petrophysics/Interpretation of **Cased Hole Logs**, **Cased Hole Formation Evaluation**, **Cased Hole Formation** Evaluation, **Cased Hole Evaluation**, **Cased-Hole Logging**, Applied **Production Logging & Cased Hole & Production Log** Evaluation, **Cased Hole Logging & Formation** Evaluation, Open & Cased Hole Logging, **Fractured Reservoir** Classification & Evaluation, Screening of Oil Reservoirs for **Enhanced Oil Recovery**, **Oil Reservoir** Evaluation & Estimation, **Reserves & Resources**, **Reserves Estimation** & **Uncertainty**, **Reserve** Evaluation, **OIP Estimation & Range** of **Uncertainty**, **Reservoir** Characterization, **Water Flooding**, **Reservoir** Souring & Water Breakthrough, **Reservoir Performance** Using Classical Methods, **Fractured Reservoir** Evaluation & Management, **Reservoir Surveillance** & Management, **Reservoir Engineering** & Simulation, **Reservoir Monitoring**, **Pressure Transient** Testing & **Reservoir** Performance Evaluation, **Reservoir** Characterization, **Reservoir** Engineering Applications with ESP & Heavy Oil, **Reservoir** Volumetrics, Water Drive **Reservoir**, **Unconventional Resource & Reserves** Evaluation, **Oil & Gas Reserves** Estimation, **Petrophysics & Rock** Properties**, Seismic** Technology, **Geological** Modelling, **Water Saturation**, **Crude Oil & Natural Gas** Demand, **Exploration Agreements & Financial** Modelling, **Seismic Survey** Evaluation, **Exploration Well** Identification, **Field Production** Operation, **Field Development** Evaluation, Crude Oil Marketing, **Core & Log Data** Integration, **Core Logging**, Advanced **Core & Log Integration**, **Well Logs & Core Analysis**, **Enhanced Oil Recovery**, **Enhanced Oil Recovery** Techniques, **Petroleum Economic** Analysis, **Oil Industry** Orientation, **Oil Production & Refining**, **Crude Oil Market**, **Global Oil Supply & Demand**, **Global Oil Reserves**, **Crude Oil** Types & Specifications, **Oil Processing**, **Oil Transportation-Methods**, **Oil & Gas** Exploration and Methods, **Oil & Gas** Extraction, Technology Usage in Industrial Security; **Upstream**, **Midstream** & **Downstream Operations**; **Oil Supply & Demand**, **Oil Contracts**, **Government Legislation & Oil Contractual Agreements**, **Oil Projects** & Their Feasibility (revenue and profitability), Rock & Fluid Properties, Fluid Flow Mechanics, PVT Analysis, Material Balance, Darcy's Law & Applications, Radial Flow, **Gas Well** Testing, Natural Water Influx, EOR Methods, Directional Drilling, **Drilling** Production & Operations, Field Development & Production of Oil & Gas, **Wireline Logging**, **Mud Logging**, **Production Logging**, **Slick Line**, **Coil Tubing**, Exploration Wells Evaluation, **Horizontal Wells**, **Well Surveillance**, **Well Testing**, **Design & Analysis**, **Well Testing & Oil Well Performance**, **Well Log Interpretation** (**WLI**), **Formation Evaluation**, **Well Workover Supervision**, **Pressure Transient Analysis** and **Petrophysical Log Analysis**. Currently, he is the **CEO** & **Managing Director** of **Geo Resources Technology** wherein he is responsible in managing the services and providing technical supports to underground energy related projects concerning **field development**, **production**, **drilling**, **reservoir engineering** and **simulation**.

Throughout his long career life, Mr. Stan has worked for many international companies such as the **Kavala Oil**, **North Aegean Petroleum Company** and **Texaco Inc.**, as the **Managing Director**, **Operations Manager**, **Technical Trainer**, **Training Consultant**, **Petroleum Engineering & Exploration Department Head**, **Assistant Chief Petroleum Engineer**, **Reservoir Engineer, Resident Petroleum Engineer**, **Senior Petroleum Engineer** and **Petroleum Engineer** wherein he has been managing the evaluation of exploration wells, reservoir simulation, development training, production monitoring, wireline logging and well testing including selection and field application of well completion methods.

Mr. Stan has a **Master's** degree in **Petroleum Engineering** and a **Bachelor's** degree in **Geology** from the **New Mexico Institute of Mining & Technology** (**USA**) and from the **Aristotelian University** (**Greece**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership of Management (ILM**) and a member of the Society of Petroleum Engineers, USA (**SPE**), Society of Well Log Professional Analysts, USA (**SPWLA**) and European Association of Petroleum Geoscientists & Engineers (**EAGE**). Moreover, Mr. Stan published numerous scientific and technical papers and delivered various trainings, courses and workshops worldwide.

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	***Overview of Rock Physics**: Importance in Oil & Gas Exploration & Production*
0930 – 0945	*Break*
0945 – 1030	***Basic Principles of Rock Physics**: Relationships Between Rock Properties*
1030 – 1130	***Rock Types & Textures:** Influence on Physical Properties*
1130 – 1215	***Petrophysical Properties of Rocks:** Porosity, Permeability & Fluid Saturation*
1215 – 1230	*Break*
1230 – 1330	***Elastic Properties of Rocks:** Young's Modulus, Poisson's Ratio & Bulk Modulus*
1330 – 1420	***Laboratory Measurement Techniques:** Methods for Measuring Rock Properties*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Well Log Interpretation:** Log Responses in Terms of Rock Properties*
0830 – 0930	***Petrophysical Evaluation of Reservoirs:** Determining Reservoir Quality Using Well Logs*
0930 – 0945	*Break*
0945 – 1100	***Fluid Substitution Analysis:** Gassmann's Equations & Fluid Effects on Rock Properties*
1100 – 1215	***Rock-Water Interaction:** Impact on Petrophysical Properties*
1215 – 1230	*Break*
1230 – 1330	***Capillary Pressure & Relative Permeability:** Their Importance in Rock Physics*
1330 – 1420	***Case Studies:** Real-World Examples of Petrophysical Data Analysis*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Principles of Geomechanics:*** *Stress, Strain, & Rock Strength*
0830 – 0930	***In-Situ Stress & Strain Analysis:*** *Techniques for Determining Stress Orientations & Magnitudes*
0930 – 0945	*Break*
0945 – 1100	***Rock Mechanical Properties & Their Measurement:*** *Laboratory & Field Methods*
1100 – 1215	***Wellbore Stability & Sand Production:*** *Analysis & Prevention Strategies*
1215 – 1230	*Break*
1230 – 1330	***Fracture Mechanics in Rock Physics:*** *Fracture Propagation & Its Impact*
1330 – 1420	***Practical Exercise:*** *Geomechanical Modeling Using Field Data*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Seismic Wave Propagation in Rocks:*** *Basics of Seismic Wave Behavior in Different Rock Types*
0830 – 0930	***Seismic Attributes & Rock Physics:*** *Linking Seismic Attributes to Rock Properties*
0930 – 0945	*Break*
0945 – 1100	***AVO (Amplitude Versus Offset) & Inversion Techniques:*** *Principles & Applications*
1100 – 1215	***Rock Physics Templates (RPTs):*** *Creating & Using RPTs for Seismic Interpretation*
1215 – 1230	*Break*
1230 – 1430	***4D Seismic & Rock Physics:*** *Monitoring Reservoir Changes Over Time*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Rock Physics Modeling & Simulation:*** *Advanced Models for Predicting Rock Behavior*
0830 – 0930	***Integration of Petrophysical, Geomechanical & Seismic Data****: Building a Comprehensive Subsurface Model*
0930 – 0945	*Break*
0945 – 1100	***Uncertainty Analysis in Rock Physics:*** *Assessing & Managing Uncertainties in Predictions*
1100 – 1230	***Emerging Technologies in Rock Physics:*** *Latest Tools & Techniques*
1230 – 1245	*Break*
1245 – 1345	***Applications in Unconventional Reservoirs:*** *Specific Considerations for Shale, Tight Gas Etc.*
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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