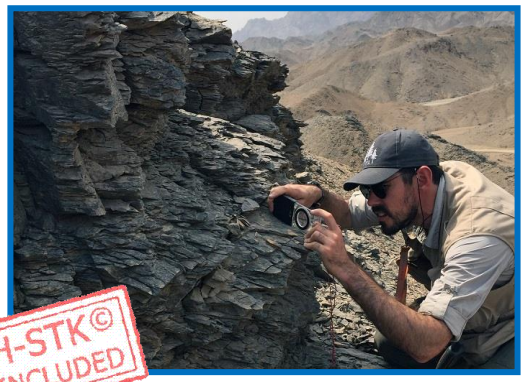
COURSE OVERVIEW DE0546
Seismic Petrophysics and Geomechanics of Unconventional Shales

Course Title
Seismic Petrophysics and Geomechanics of Unconventional Shales



Course Date/Venue
Session 1: July 14-18, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 21-25, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
DE0546

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 Seismic Petrophysics and Geomechanics of Unconventional Shales. It covers the unconventional shale reservoirs, rock properties in shale reservoirs and seismic wave propagation in shales; the basics of seismic petrophysics, data acquisition in unconventional shales and petrophysical characterization of shales; the advanced logging tools for shales, elastic properties of shales and seismic inversion for shale properties; and the role of anisotropy in shale reservoirs.

During this interactive course, participants will learn the seismic attributes for shale reservoirs and petrophysical modeling in shales; the geomechanics in shales, stress regimes in shale reservoirs and mechanical properties of shales; the fracture mechanics in shales, pore pressure and stress coupling; the hydraulic fracturing basics and fracture characterization in shales; the microseismic monitoring, seismic monitoring of reservoir changes, wellbore stability analysis and integration of geomechanics with petrophysics; the integrated workflows for shale reservoirs and uncertainty analysis in shale development; and the emerging technologies in shale development.

Course Objectives

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

- Apply and gain an in-depth knowledge on seismic petrophysics and geomechanics of unconventional shales
- Discuss unconventional shale reservoirs, rock properties in shale reservoirs and seismic wave propagation in shales
- Explain the basics of seismic petrophysics, data acquisition in unconventional shales and petrophysical characterization of shales
- Identify advanced logging tools for shales, elastic properties of shales and seismic inversion for shale properties
- Define the role of anisotropy in shale reservoirs and discuss seismic attributes for shale reservoirs and petrophysical modeling in shales
- Determine geomechanics in shales, stress regimes in shale reservoirs and mechanical properties of shales
- Recognize fracture mechanics in shales, pore pressure and stress coupling
- Interpret hydraulic fracturing basics and fracture characterization in shales
- Carryout microseismic monitoring, seismic monitoring of reservoir changes, wellbore stability analysis and integration of geomechanics with petrophysics
- Discuss the integrated workflows for shale reservoirs, uncertainty analysis in shale development and emerging technologies in shale development

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 seismic petrophysics and geomechanics of unconventional shales for geophysicists and geologists, petroleum engineers, reservoir engineers, geomechanics engineers, data scientists and analysts, academics and researchers, energy industry consultants 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

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 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 **30 years** of **Offshore & Onshore** extensive experience within the **Oil**, **Gas & Petroleum** industries**.** His area of expertise include **Reserves & Resources**, **Reserves Estimation & Uncertainty**, **Reservoir** Characterization, **Unconventiona**l **Resource & Reserves** Evaluation, **Oil & Gas Reserves** Estimation, Methods for **Aggregation of Reserves & Resources**, **Fractured Reservoir** Classification & Evaluation, **Sequence Stratigraphy**, **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**, 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, Screening of Oil Reservoirs for **Enhanced Oil Recovery**, **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 Reservoir** Evaluation & Estimation, **Oil Supply & Demand**, **Oil Contracts**, **Government Legislation & Oil Contractual Agreements**, **Oil Projects** & Their Feasibility (revenue and profitability), **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 and Heavy Oil, **Reservoir** Volumetrics, Water Drive Reservoir, **Reserve** Evaluation, 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**, **Cased Hole 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 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.

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 – 0900	***Introduction to Unconventional Shale Reservoirs*** *Definition and Characteristics of Unconventional Shales • Comparison with Conventional Reservoirs • Importance of Shales in Global Energy Production • Key Challenges in Developing Shale Reservoirs*
0800 - 0930	***Rock Properties in Shale Reservoirs*** *Porosity and Permeability in Shales • Clay Mineralogy and Its Impact on Petrophysical Properties • Total Organic Carbon (TOC) and Its Significance • Brittleness Index and Its Relevance*
0930 – 0945	*Break*
0945 – 1130	***Seismic Wave Propagation in Shales*** *Basics of Seismic Wave Types (P-Wave, S-Wave) • Anisotropy in Shales and Its Implications • Seismic Velocity Relationships with Shale Properties • Attenuation and Dispersion in Shales*
1130 – 1230	***Basics of Seismic Petrophysics*** *Linking Seismic Data to Petrophysical Properties • Understanding Elastic Moduli (Young's Modulus, Poisson's Ratio) • Density and Velocity Relationships in Shales • Crossplots for Seismic Property Interpretation*
1230 – 1245	*Break*

1245 – 1330	***Data Acquisition in Unconventional Shales*** *Core Sampling and Analysis • Well Logging Techniques (e.g., Resistivity, Density, Sonic Logs) • Overview of Seismic Acquisition for Shales • Challenges of Data Acquisition in Shale Plays*
1330 - 1420	***Petrophysical Characterization of Shales*** *Techniques for Estimating TOC • Determining Mineral Composition Using Spectroscopy • Understanding Water Saturation and Capillary Pressure • Microstructure Analysis Using Imaging Tools (SEM, CT scans)*
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	***Advanced Logging Tools for Shales*** *Nuclear Magnetic Resonance (NMR) Logs • Spectral Gamma-Ray and Elemental Capture Spectroscopy • Microresistivity Imaging Logs • Dipole Sonic Logs and Anisotropy Analysis*
0830 - 0930	***Elastic Properties of Shales*** *Stress-Dependent Elastic Moduli • Dynamic versus Static Moduli • Role of Pore Pressure and Effective Stress • Laboratory Techniques for Elastic Property Measurement*
0930 – 0945	*Break*
0945 – 1100	***Seismic Inversion for Shale Properties*** *Principles of Post-Stack and Pre-Stack Inversion • Extracting Elastic Properties from Seismic Data • Seismic-to-Well Tie Workflows • Applications in Identifying Brittleness and Fractures*
1200 – 1230	***Role of Anisotropy in Shale Reservoirs*** *Types of Anisotropy (Vertical Transverse Isotropy, Horizontal Transverse Isotropy) • Measuring and Interpreting Thomsen Parameters • Impact of Anisotropy on Wave Propagation • Anisotropy Considerations in Fracture Modeling*
1230 – 1245	*Break*
1245 – 1330	***Seismic Attributes for Shale Reservoirs*** *Common Seismic Attributes for Shale Interpretation • Amplitude Versus Offset (AVO) Analysis • Curvature Attributes for Identifying Fractures • Frequency and Phase Analysis for Thin-Bed Detection*
1330 - 1420	***Petrophysical Modeling in Shales*** *Building Models from Well Logs • Petrophysical Cutoffs for Unconventional Reservoirs • Integrating Seismic and Petrophysical Models • Uncertainty Analysis in Petrophysical Predictions*
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	***Basics of Geomechanics in Shales*** *Definition and Significance of Geomechanics • Key Geomechanical Parameters (Stress, Strain, and Pore Pressure) • Elastic and Plastic Deformation in Shales • Importance of Geomechanics in Hydraulic Fracturing*
0830 - 0930	***Stress Regimes in Shale Reservoirs*** *Types of In-Situ Stresses (Vertical, Horizontal, and Differential) • Stress Orientation and Mapping Techniques •Stress-Strain Relationships in Unconventional Reservoirs •Implications for Wellbore Stability and Completions*
0930 – 0945	*Break*
0945 – 1100	***Mechanical Properties of Shales*** *Measurement Techniques (Uniaxial and Triaxial Tests) • Role of Mineralogy in Determining Mechanical Behavior • Laboratory versus Field Measurements of Mechanical Properties • Time-Dependent Deformation (Creep) in Shales*
1200 – 1230	***Fracture Mechanics in Shales*** *Natural versus Induced Fractures • Modes of Fracture Propagation (Mode I, II, III) • Stress Shadow Effects During Hydraulic Fracturing • Influence of Fluid Properties on Fracture Growth*
1230 – 1245	*Break*
1245 – 1330	***Pore Pressure & Stress Coupling*** *Role of Pore Pressure in Geomechanics • Effective Stress Principle in Shales • Methods for Pore Pressure Prediction (e.g., Eaton's Method) • Pore Pressure Changes During Production and Their Implications*
1330 - 1420	***Geomechanical Modeling in Shales*** *Building 1D and 3D Geomechanical Models • Input Data Requirements and Workflows • Calibrating Models with Field Data • Applications in Well Planning and Fracture Design*
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

0730 – 0830	***Hydraulic Fracturing Basics*** *Key Principles of Hydraulic Fracturing • Design Parameters (Fluid Type, Proppant Selection, etc.) • Stages of Hydraulic Fracturing Operations • Challenges in Shale Fracturing*
0830 - 0930	***Fracture Characterization in Shales*** *Techniques for Detecting Natural Fractures • Role of Fractures in Enhancing Reservoir Productivity • Interplay Between Fractures and Shale Anisotropy • Fracture Conductivity and Proppant Behavior*
0930 – 0945	*Break*
0945 – 1100	***Microseismic Monitoring*** *Basics of Microseismic Event Detection • Equipment and Techniques for Microseismic Monitoring • Interpretation of Microseismic Data for Fracture Mapping • Applications in Optimizing Hydraulic Fracturing Design*
1200 – 1230	***Seismic Monitoring of Reservoir Changes*** *Time-Lapse (4D) Seismic Surveys • Detecting Changes in Stress and Pressure Fields • Monitoring Production-Induced Geomechanical Changes • Challenges in Seismic Monitoring of Shales*

1230 – 1245	*Break*
1245 – 1330	***Wellbore Stability Analysis*** *Causes and Consequences of Wellbore Instability • Role of Mud Weight and Drilling Practices • Identifying and Mitigating Wellbore Failures • Case Studies of Wellbore Stability in Shales*
1330 - 1420	***Integration of Geomechanics with Petrophysics*** *Linking Geomechanical Models with Seismic and Petrophysical Data • Impact of Geomechanics on Reservoir Quality Prediction • Role in Optimizing Production Strategies • Case Studies of Integrated Workflows*
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

0730 – 0830	***Integrated Workflows for Shale Reservoirs*** *Combining Seismic, Petrophysical, and Geomechanical Data • Multidisciplinary Approaches for Reservoir Characterization • Best Practices for Integrating Different Datasets • Challenges in Integrated Analysis*
0830 - 0930	***Shale Reservoir Simulation*** *Overview of Reservoir Simulation Tools • Incorporating Geomechanical and Petrophysical Data into Models • History Matching and Production Forecasting • Case Studies of Shale Reservoir Simulations*
0930 – 0945	*Break*
0945 – 1100	***Uncertainty Analysis in Shale Development*** *Sources of Uncertainty in Data and Models • Techniques for Quantifying Uncertainty • Decision-Making under Uncertainty • Applications in Field Development Planning*
1100 – 1230	***Emerging Technologies in Shale Development*** *Machine Learning and AI in Seismic and Petrophysics • Fiber Optic Monitoring Technologies • Advances in 4D Seismic and Geomechanical Modeling • Nanotechnology Applications in Shale Reservoirs*
1230 – 1245	*Break*
1245 – 1345	***Case Studies of Shale Reservoirs*** *Key Insights from Major Shale Plays (e.g., Barnett, Marcellus, Permian) • Lessons Learned from Successful and Failed Developments • Application of Seismic Petrophysics and Geomechanics in Real Fields • Future Directions for Unconventional Shale Development*
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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