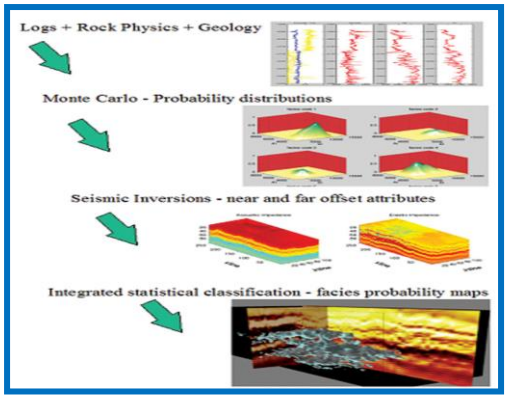
COURSE OVERVIEW DE0609
Rock Physics - Integrating Petrophysical, Geomechanics, and Seismic Measurements

Course Title
Rock Physics - Integrating Petrophysical, Geomechanics, and Seismic Measurements

Course Date/Venue
August 10-14, 2026/Online Virtual Training

Course Reference
DE0609

Course Duration/Credits
Five days/2.75 CEUs/27.5 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.

Rock Physics is a key component in oil and gas exploration, development and production. It combines concepts and principles from geology, geophysics, petrophysics, applied mathematics and other disciplines. Rock physics provides the empirical relationships, understanding and theory to connect petrophysical, geomechanical and seismic data to the intrinsic properties of rocks, such as mineralogy, porosity, pore shapes, pore fluids, pore pressures, stresses and overall architecture, such as laminations and fractures.

Rock physics is needed to optimize all imaging and reservoir characterization solutions based on geophysical data, and to such data to build mechanical earth models for solving geomechanical problems. An in depth understanding of rock and fluid physics is crucial for any successful seismic attribute interpretation as well as substantially reducing drilling risk. Seismic petrophysics aims to quantitatively link rock properties with reservoir petrophysical properties. This knowledge then allows for careful attribute screening and the creation of rock physics models properly calibrated to local/regional well data, which could then be used to forward model the seismic response. In order to construct geologically realistic rock physics models, the rock physicist needs to be able to identify and correct anomalous and/or missing data from a petrophysical wireline analysis.

This course is designed for participants to understand the sensitivity of elastic waves in the earth to mineralogy, porosity, pore shapes, pore fluids, pore pressures, stresses, and the anisotropy of the rock fabric resulting from the depositional and stress history of the rock, and how to use this understanding in quantitative interpretation of seismic data and in the construction of mechanical earth models.

The course will provide a basic understanding of the relations between elastic and reservoir properties of rocks and demonstrate how rock physics is used to interpret and analyze seismic data. A variety of applications and real data examples is presented. Various rock physics models will be covered and the validity of these models to particular geological scenarios will be discussed.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on rock physics and petro physics for seismic interpretation
- Discuss rock physics, hooke's law, anisotropy and elastic wave velocities as well as sedimentary rocks as heterogeneous media
- Describe the concept of the representative elementary volume (REV), elastic properties, voigt/reuss and hashin-shtrikman bounds, modulus-porosity relations for clean sands, critical porosity, mechanical percolation, gassmann's equations and fluid substitution
- Explain fluid properties and mixtures, digenetic and sorting trends in velocity-porosity data, velocity-porosity models for shaly sands, empirical relations between velocity and porosity, clay content, properties of sand-clay mixtures and velocity-porosity relations for shales
- Differentiate the relations between VP and VS rock compressibilities, the relation of 4d seismic to well testing, reflection coefficients and AVO, elastic impedence and rock physics templates
- Identify the effective medium and effective field theories, velocity-porosity relations for carbonates, biot theory, patchy saturation, squirt flow, sediment compaction and the state of stress in the earth
- Recognize pore pressure and the concept of effective stress, poroelasticity, application to pore prediction pressure, fracture gradient, 3D stress modeling, effect of stress on seismic body waves and third-order elasticity
- Carryout granular media and discrete element methods as well as displacement discontinuity methods
- Discuss stress sensitivity of sandstones and shales, determination of velocity variations around a borehole from advanced sonic logging, application to wellbore stability, reservoir geomechanics and stress effects in 4D seismic monitoring
- Explain fractured reservoirs, hydraulic fracture propagation in presence of natural fractures, seismic characterization of fractured reservoirs, modeling the response of a fractured reservoir, rock physics models for fractures, shales and unconventional reservoirs
- Determine anisotropy of shales, rock physics modeling of kerogen in organic-rich shales, effect of anisotropy on AVO and microseismic and the effect of azimuthal anisotropy on propagation of hydraulic fractures

Who Should Attend

This course provides an overview of all significant aspects and considerations of rock physics and petro physics for seismic interpretation for all geoscientists who wish to gain a better understanding and applicability of the rock physics models in the context of diverse geological scenarios.

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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Virtual Training (If Applicable)

If this course is delivered online as a Virtual Training, the following limitations will be applicable:-

Certificates	Only soft copy certificates will be issued to participants through Haward's Portal. This includes Wallet Card Certificates if applicable
Training Materials	Only soft copy Training Materials (PDF format) will be issued to participant through the Virtual Training Platform
Training Methodology	80% of the program will be theory and 20% will be practical sessions, exercises, case studies, simulators or videos
Training Program	The training will be for 6 hours per day starting at 0800 and ending at 1400
H-STK Smart Training Kit	Not Applicable
Hands-on Practical Workshops	Not Applicable
Site Visit	Not Applicable
Simulators	Only software simulators will be used in the virtual courses. Hardware simulators are not applicable and will not be used in Virtual Training

Course Fee

US$ 4,000 per Delegate + **VAT**.

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 **2.75 CEUs** (Continuing Education Units) or **27.5 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:

Dr. Chris Kapetan, PhD, MSc, is a **Senior Petroleum Engineer** with over **30 years** of international experience within the **onshore** and **offshore oil** & **gas** industry. His wide experience covers **Rock Physics** Fundamentals & Applications, Quantitative Seismic **Rock Physics,** Seismic Velocity & **Rock** Property Relationships, **Pore Pressure & Geomechanical** Properties, Borehole Acoustic & Sonic **Measurements, Rock Physics** Templates & Fluid Substitution, Seismic-Well Tie & **Rock Physics** Calibration, **AVO Analysis & Elastic Property Estimation,** Laboratory **Rock Physics & Core Measurements, Integrated** Subsurface Data for **Rock Physics** Modeling, **Decision Analytic Modelling Methods** for **Economic Evaluation**, **Probabilistic Risk Analysis** (**Monte Carlo Simulator**) **Risk Analysis Foundations**, **Global Oil Demand**, Crude Oil Market, Global Oil Reserves, Oil Supply & Demand, Governmental Legislation, Contractual Agreements, **Financial** Modeling, **Oil Contracts**, **Project Risk Analysis**, **Feasibility Analysis** Techniques, **Capital Operational Costs**, Oil & Gas Exploration Methods, **Reservoir** Evaluation, **Extraction of Oil & Gas**, **Crude** Oil Types & Specifications, Sulphur, Sour Natural Gas, **Natural Gas Sweeting**, **Petroleum Production**, Field Layout, **Production** Techniques & Control, **Surface Production** Operations, **Oil Processing**, Oil Transportation-Methods, **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 **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** and **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** and **Drilling** & **Workover Engineer**, **Operations Consultant**, **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** 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**.

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 **Monday, 10th of August 2026**

0800 – 0815	*Registration & Coffee*
0815 – 0830	*Welcome & Introduction*
0830 – 0845	***PRE-TEST***
0845 – 0930	***Introduction to Rock Physics*** *What is Rock Physics? ● Rock Physics & Petrophysics ● What's the Difference?*
0930 – 0945	*Break*
0945 – 1015	***Hooke's Law, Anisotropy & Elastic Wave Velocities***
1015 – 1045	***Sedimentary Rocks as Heterogeneous Media***
1045 – 1115	***The Concept of the Representative Elementary Volume (REV) & Effective Elastic Properties***
1115 – 1145	***Voigt/Reuss & Hashin-Shtrikman Bounds***
1145 – 1215	***Modulus-Porosity Relations for Clean Sands***
1215 – 1230	*Break*
1230 – 1300	***Critical Porosity & Mechanical Percolation***
1300 – 1330	***Gassmann's Equations & Fluid Substitution***
1330 – 1350	***Fluid Properties & Mixtures***
1350 – 1400	***Recap***
1400	*End of Day One*

Day 2 **Tuesday, 11th of August 2026**

0800 – 0845	***Digenetic & Sorting Trends in Velocity-Porosity Data***
0845 – 0930	***Velocity-Porosity Models for Shaly Sands***
0930 – 0945	*Break*
0945 – 1015	***Empirical Relations Between Velocity & Porosity, Clay Content, etc.***
1015 – 1040	***Properties of Sand-Clay Mixtures***
1040 – 1100	***Velocity-Porosity Relations for Shales***
1100 – 1120	***Relations Between VP & VS***
1120 – 1145	***Rock Compressibilities & Relation of 4D Seismic to Well Testing***
1145 – 1210	***Reflection Coefficients & AVO***
1210 – 1230	***Elastic Impedence***
1230 – 1245	*Break*
1245 – 1310	***Rock Physics Templates***
1310 – 1330	***Effective Medium & Effective Field Theories***
1330 – 1350	***Velocity-Porosity Relations for Carbonates***
1350 – 1400	***Recap***
1400	*End of Day Two*

Day 3 **Wednesday, 12th of August 2026**

0800 – 0845	***Biot Theory***
0845 – 0930	***Patchy Saturation***
0930 – 0945	*Break*
0945 – 1030	***Squirt Flow***

1030 – 1130	***Sediment Compaction & the State of Stress in the Earth***
1130 – 1230	***Pore Pressure & the Concept of Effective Stress***
1230 – 1245	*Break*
1245 – 1330	***Poroelasticity***
1330 – 1350	***Application to Pore Prediction Pressure***
1350 – 1400	***Recap***
1400	*End of Day Three*

Day 4 ***Thursday, 13th of August 2026***

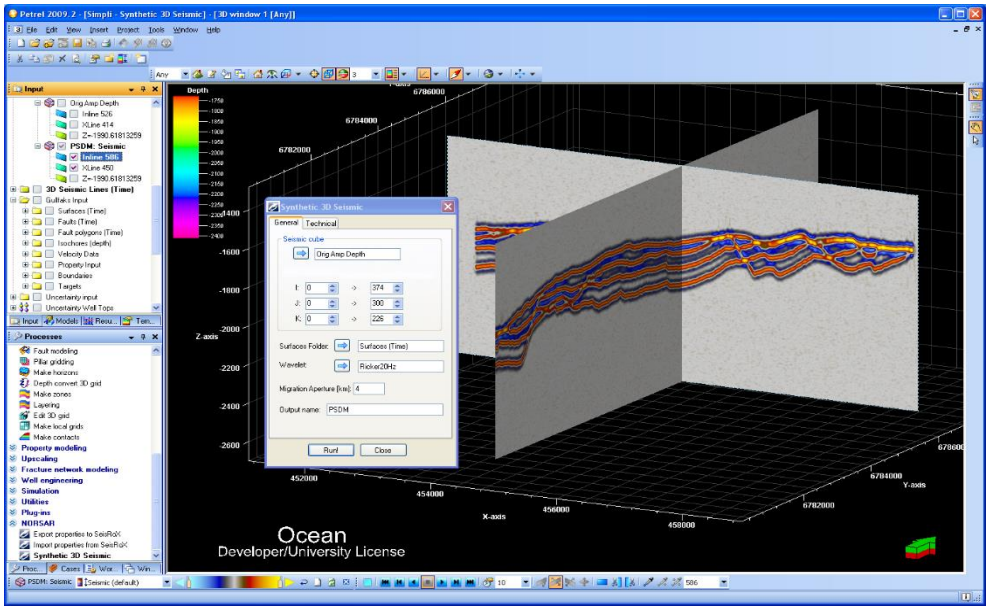
0800 – 0845	***Fracture Gradient & 3D Stress Modeling***
0845 – 0930	***Effect of Stress on Seismic Body Waves***
0930 – 0945	*Break*
0945 – 1015	***Third-Order Elasticity***
1015 – 1040	***Granular Media & Discrete Element Methods***
1040 – 1100	***Displacement Discontinuity Methods***
1100 – 1120	***Stress Sensitivity of Sandstones***
1120 – 1145	***Stress Sensitivity of Shales***
1145 – 1230	***Stress Perturbations Around a Borehole***
1230 – 1245	*Break*
1245 – 1310	***Determination of Velocity Variations around a Borehole from Advanced Sonic Logging***
1310 – 1330	***Application to Wellbore Stability***
1330 – 1350	***Reservoir Geomechanics & Stress Effects in 4D Seismic Monitoring***
1350 – 1400	***Recap***
1400	*End of Day Four*

Day 5 ***Friday, 14th of August 2026***

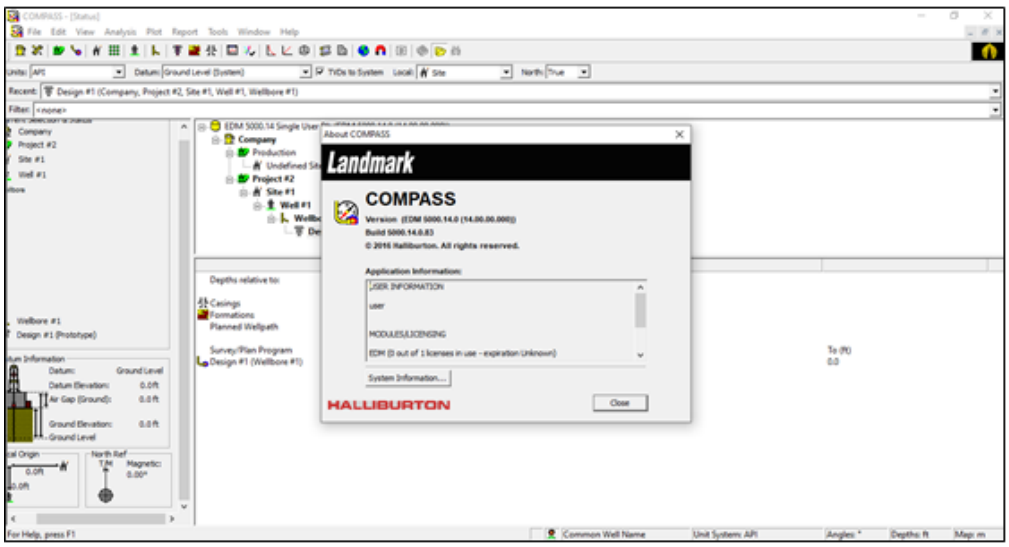
0800 – 0845	***Fractured Reservoirs***
0845 – 0930	***Hydraulic Fracture Propagation in Presence of Natural Fractures***
0930 – 0945	*Break*
0945 – 1015	***Seismic Characterization of Fractured Reservoirs***
1015 – 1040	***Modeling the Response of a Fractured Reservoir***
1040 – 1100	***Rock Physics Models for Fractures***
1100 – 1120	***Shales & Unconventional Reservoirs***
1120 – 1145	***Anisotropy of Shales***
1145 – 1215	***Rock Physics Modeling of Kerogen in Organic- Rich Shales***
1215 – 1230	*Break*
1230 – 1300	***Effect of Anisotropy on AVO***
1300 – 1330	***Microseismic & Effect of Azimuthal Anisotropy on Propagation of Hydraulic Fractures***
1330 – 1345	***Course Conclusion***
1345 – 1400	***POST-TEST***
1400	*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 “Petrel Software” & “COMPASS” ,



Petrel Software



COMPASS

Course Coordinator

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