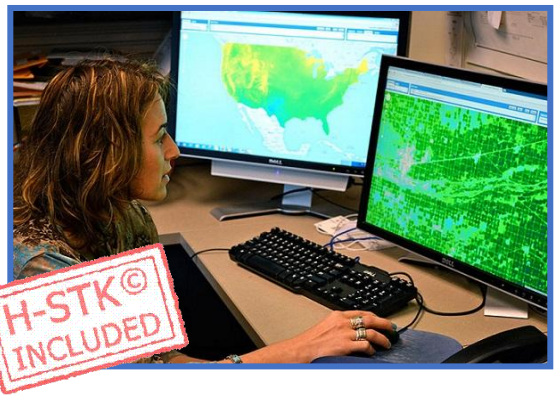
COURSE OVERVIEW DE0087
Fractured Reservoir Characterisation

Course Title
Fractured Reservoir Characterisation

Course Date/Venue
Please refer to page number 3

Course Reference
DE0087

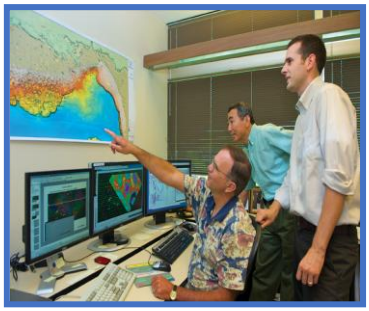
Course Duration/Credits
Five days/3.0 CEUs/30 PDHs



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.

More than fifty percent of the petroleum reservoirs are in carbonate rocks. In the Middle East, it is estimated that this number increases to seventy percent. A great number of these reservoirs are naturally fractured, e.g., Ghawar field, in Saudi Arabia, Cantarell field in Mexico and Yates field in the USA. These are three of the largest fields in the world. The interest in such fields has grown tremendously.



The presence of extensive networks of natural fractures creates a number of challenges for evaluating and optimizing recovery from naturally fractured reservoirs. The use of dual porosity or dual permeability models is often necessary, providing the basis for both analytical methods (such as used for pressure transient analysis) as well as for reservoir simulation. Appropriate application of dual porosity and dual permeability models, however, rely on: a) accurate representation of the fracture system as an equivalent porous and permeable medium, and b) accurate determination of the rates of fluid transport between matrix blocks and the fracture system.

This course is designed to provide different approaches for evaluation and characterization of heterogeneous naturally fractured carbonate reservoirs by wire-line log, core analysis and well testing. Different methods for modelling and dynamic simulation of naturally fractured reservoirs and case histories will be reviewed including multiple porosity model with structured grids and single porosity with unstructured grids. Production data analysis of unconventional reservoirs will also be reviewed.

The course covers the fractured reservoirs, learn how to recognize and evaluate natural fractured reservoir; the overall effect of natural fractures on subsurface fluid-flow; the techniques that employ outcrop and subsurface rock data; the methods for controlling short-term and long-term performance in fractured reservoirs; the various types of data necessary to evaluate and manage them; and the geologic aspects, origin and classification of fractured reservoirs.

During this interactive course, participants will learn the geologic aspects and petrophysics properties of carbonate rock; the overall effect of natural fractures on subsurface fluid-flow; the reservoir characterization principals and techniques that employ outcrop and subsurface rock data; the types of data necessary to characterize the natural fracture reservoir and the modelling work flow; the fracture reservoir characterizing model can be constructed emphazing on carbonate; the methods for controlling short-term and long-term performance in fractured reservoirs; and the geologic aspects, petrophysics and rock properties.

Course Objectives

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

- Apply and gain an in-depth knowledge on fractured reservoir characterization with emphasis on carbonates
- Classify fractured reservoirs, learn how to recognize and evaluate natural fractured reservoir
- Predict the overall effect of natural fractures on subsurface fluid-flow
- Illustrate techniques that employ outcrop and subsurface rock data
- Carryout methods for controlling short-term and long-term performance in fractured reservoirs
- Identify the various types of data necessary to evaluate and manage them
- Discuss the geologic aspects, origin and classification of fractured reservoirs
- Discuss the geologic aspects and petrophysics properties of carbonate rock.
- Predicting the overall effect of natural fractures on subsurface fluid-flow
- Learn how to recognize and evaluate natural fractured reservoir.
- Discuss the reservoir characterization principals and techniques that employ outcrop and subsurface rock data.
- Discuss the types of data necessary to characterize the natural fracture reservoir and the modelling work flow.
- Discuss how fracture reservoir characterizing model can be constructed emphazing on carbonate
- Explain methods for controlling short-term and long-term performance in fractured reservoirs.
- Discuss the geologic aspects, petrophysics and rock properties

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 fractured reservoir characterization with emphasis on carbonates for geologists, petrophysicists, geophysicists and reservoir engineers involved in the development and management of fractured carbonate reservoirs.

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 Date/Venue

Session(s)	Date	Venue
1	April 26-30, 2026	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
2	May 18-22, 2026	Salon Expo, NH Hotel Plaza de Armas, Seville, Spain
3	August 02-06, 2026	Meeting Plus 9, City Centre Rotana, Doha, Qatar
4	September 13-17, 2026	Meeting Room 4, Four Seasons Hotel Cairo at Nile Plaza, Corniche El Nil, Garden City, Cairo, Egypt
5	October 18-22, 2026	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
6	December 07-11, 2026	Ruben Boardroom, The Rubens at The Palace, Buckingham Palace Road, London, United Kingdom
7	January 24-28, 2027	Meeting Plus 9, City Centre Rotana, Doha, Qatar
8	March 14-18, 2027	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

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

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 **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:

Dr. Steve Ehrenberg, PhD, MSc, BSc, is a **Senior Geologist & Reservoir Engineer** with **over 30 years** of extensive experience within the **Oil** & **Gas**, **Petrochemical** and **Refinery** industries. His wide experience covers in the areas of **Core** & **Log Integration**, **Water Saturation**, **Coring** & **Core Analysis**, **Special Core Analysis**, **Log** Interpretation, Cased-Hole Logging, **Core Calibration**, **Core Analysis**, Core-to-Log Data Integration (**SCAL**), **Wireline** Logging, **Mud** Logging, **Cased Hole** Logging, **Production** Logging, **Well Logging**, **Reservoir** Management, **Reservoir** Appraisal & Development, **Carbonate Reservoir** Management, **Fractured Reservoirs** Evaluation & Management, **Naturally Fractured Reservoir**, Integrated **Carbonate Reservoir** Characterization, **Geological Modelling**, **Reservoir Characterization**, **Geomodelling**, Development **Geology**, **Petroleum Geology**, **Exploration Production**, **Structural Geology**, **Wellsite Geology**, Analytic Modelling Methods, **Sedimentary Geology**, **Geophysics**, **Geophysical Exploration**, **Reservoir** Engineering, **Reservoir** Engineering Applications, **Reservoir** Engineering & Stimulation, **Reservoir** Characterization, **Clastic Reservoir**, **Carbonate Reservoir Petrology**, Subsurface Facies Analysis, **Borehole Images, Geophysical Methods**, **Oil & Gas Exploration**, **Marine & Petroleum Geology**, **Reservoir Performance** Using Classical Methods, **Fractured Reservoir** Evaluation & Management, **Reservoir** Surveillance & Management, **Reservoir Monitoring**, , **Reservoir Volumetrics**, **Water Drive Reservoir**, **Reservoir Evaluation**, **Well Surveillance**, **Well Testing**, **Well Testing** & Oil Well Performance, Well Log Interpretation (**WLI**), Rock Physics & Seismic Data, **Formation Evaluation**, **Well Testing** & Data Interpretation, **Pore Pressure** Prediction and **Oil & Gas Reserves Estimations**, Well Workover Supervision, Description and Prediction of **Reservoir Quality**, **Sequence Stratigraphy** of Carbonate Systems and Introductory Geology.

During his career life, Dr. Ehrenberg held significant positions and dedication as **Consultant**, **Professor**, **Senior Reservoir Geologist**, **Senior Geologist**, **Research Geologist**, **Associate Professor**, **Assistant Professor** and **Senior Instructor/Trainer** from various international companies and universities such as the Badley Ashton & Associates Ltd., Khalifa University of Science and Technology, Sultan Qaboos University, PanTerra Geoconsultants B.V, UAE University, Statoil, Stavanger, Shell Development Company and Northern Illinois University.

Dr. Ehrenberg has a **PhD**, **Master's** and **Bachelor's** degree in **Geology** from the **University of California**, **USA** and **Occidental College**, **USA**, respectively. Further, he is a **Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management** (**ILM**), a **Certified Instructor/Trainer** and has delivered numerous trainings, workshops, courses, seminars and conferences internationally.

Course Fee

Dubai	**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.
Seville	**US$ 8,800** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Doha	**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.
Cairo	**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.
London	**US$ 8,800** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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 & Introductions*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Fracture Reservoir*** *Definition ● Origin*
0930 – 0945	*Break*
0945 – 1100	***Fracture Reservoir (cont'd)*** *Classification ● Character*
1100 – 1200	***Hydrocarbon Reservoir Properties*** *Definition*
1200 – 1215	*Break*
1215 – 1420	***Hydrocarbon Reservoir Properties (cont'd)*** *Petrophysical Characters*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Hydrocarbon Reservoir Properties (cont'd)*** *Geological Aspects*
0930 – 0945	*Break*
0945 – 1100	***Carbonate Rock*** *Definition ● Origin*
1100 – 1200	***Carbonate Rock (cont'd)*** *Classification*
1200 – 1215	*Break*

1215 – 1420	***Carbonate Rock (cont'd)*** *Geological Aspects*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Carbonate Rock (cont'd)*** *Petrophysical Character*
0930 – 0945	*Break*
0945 – 1100	***Reservoir Modeling*** *Definition ● Purpose*
1100 – 1200	***Reservoir Modeling (cont'd)*** *Source of Information*
1200 – 1215	*Break*
1215 – 1350	***Reservoir Modeling (cont'd)*** *Workflow*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Natural Fracture Reservoir Modeling*** *Introduction*
0930 – 0945	*Break*
0945 – 1100	***Natural Fracture Reservoir Modeling (cont'd)*** *Indications of Presence of Fractures in Reservoir*
1100 – 1200	***Natural Fracture Reservoir Modeling (cont'd)*** *Application of Work Flow* *Surface Outcrops • Coring Analysis*
1200 – 1215	*Break*
1215 – 1350	***Natural Fracture Reservoir Modeling (cont'd)*** *Application of Work Flow (cont'd)* *Petrophysical Analysis • Coring & Petrophysical Analysis Integration*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Natural Fracture Reservoir Modeling (cont'd)*** *Application of Work Flow (cont'd)* *Construction Petrophysical Modeling • Geophysical Technology • Construction Geological & Structure Modeling*
0930 – 0945	*Break*
0945 – 1100	***Natural Fractures in Field Development***
1100 – 1200	***Methods for Controlling Short-Term & Long-Term Performance in Fractured Reservoirs***
1200 – 1215	*Break*
1215 – 1330	***Case Studies***
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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org