



«MWD OF HORIZONTAL AND DIRECTIONAL WELLS», 5 days

COURSE OBJECTIVE:

Development of professional competencies of drilling, completion and workover engineers, geologists, geoscientists, supervisors, drilling projects managers in sphere of modern technologies and telemetering equipment for drilling support and workover of directional and horizontal wells.

ACQUIRED ABILITIES:

- To choose telemetering equipment for different subsurface conditions;
- To design and justify equipment for well deviation;
- To analyze a telemetering system integrity at different stages of operation;
- To estimate subsurface conditions of hole drilling and choose a directional drilling technology.

COURSE CONTENT:

Module Name	Content
Geosteering fundamentals	Geosteering. Main objective. Terminology.
Directional survey (inclinometry)	Inclinometry as a main kind of well logging while drilling for well spatial reasoning. Inclination and azimuthal angles.
Well deviation patterns	Oil and gas fields cross-sections rocks. Physical-mechanical properties. Rock occurrence features at high north regions.
Technical means and well deviation management	Steerable facilities. Bent sub, angle imbalance controller block for PDM, deviators for completion while drilling and sidetrack drilling, measuring equipment for facility angle detection. Deviation setting methods: direct, indirect, directional.
History of magnetic and hydroscopic pick-ups	Development of angle measuring technics. Magnetic and hydroscopic pick-ups.
Directional survey sensors and apparatus	Magnetic pick-ups, mechanic and electronic compasses. Master gyroscopes. Inertial navigation systems.
Gravitational and magnetic field: measuring technics	Gravity and magnetic field vectors, measuring units. Acceleration indicators and magnetic detectors operation, failures detection. Cartesian reference system for gravity and magnetic fields. Magnetic deviation. Magnetic and gravity force.
Downhole inclinometry	Study of existing telemetering systems, its applicability and characteristics. Inaccuracies, deficiencies and advantages.

systems and its comparative characteristics	Manufacturers.
Content of telemetry and geosteering equipment complex	Configuration of aboveground and underground telemetering installations. Modules of telemetering systems, purpose, operation principles. Pulsators, dipole pairs, inclinometers, gamma, connectors, decoding devices, pick-ups, generators, and batteries.
Telemetering systems communication facilities	Study of communication facilities with use of bottom hole telemetering equipment. Hydraulic, electromagnetic, conducting, and acoustic channels.
System failures, diagnostics and prevention measures	Classification of steering equipment failures, diagnostics, remedies. Study of vibration and downhole equipment influence. Interference while signal transmission and decoding.
Telemetering system configuration content	Assembly of telemetering systems, sequence, measuring. Technical inspection, programming, testing. Non-magnetic drill collars, flushing and fixing adapters.
Power equipment of telemetering systems	Telemetering systems power generation principle. Composition and operation of DC generators, and batteries.
Well logging and geosteering while drilling	Well logging while drilling. Gamma-ray, acoustic, neutron, and electrical logging. Configuration and operation principles of LWD tools.