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«MODERN OIL PRODUCTION TECHNOLOGY. OIL AND GAS FACILITIES FUNDAMENTALS», 5 days

COURSE OBJECTIVE:

Develop professional competencies in design engineering and operation of equipment and well completion, treatment and gathering facilities, including understanding of petroleum objects and technics fundamentals.

ACQUIRED ABILITIES:

- Identify main parameters of production objects for facility engineering;
- Analyze downhole and surface equipment configuration and purpose;
- Develop conceptual field layout schemes;
- Identify the need for wellwork and kinds of measures;
- Develop managing and corrective actions for field development optimization.

COURSE CONTENT:

Module Name	Content
Introduction	Petroleum industry (review). Petroleum operations outline. Oil & gas production and resources. Phasing of petroleum industry.
Physical-chemical properties. Crude oil emulsions	Formation fluids. Physical-chemical properties of oil. Chemical composition. Oils classification. Oil as a dispersion system. Gas saturation of oil. Oil compressibility. Formation volume factor. Oil density. Oil viscosity. Oil rheology. Physical-chemical properties of oil-associated gas. Oil-water emulsions, physical-chemical properties. Emulsions stability factors. Methods of emulsion breaking.
Prospecting and exploration of oil and gas fields	Oil and gas. Petroleum systems. Oil & gas accumulation. Reservoirs classification. Unconventional reservoirs. Coal bed methane. Prospecting and exploration methods: geological, remote sensing, drilling, geochemical. Geophysical methods while prospecting and exploration. Well construction (drilling). Prospecting and exploration phasing. Stages of geological exploration, production support.
Field development	Classification of fields. Reservoir energy sources. Reservoir development systems. Completion and stimulation of well. Oil and gas inflow generalities. Exploration, production, injection, and piezometric wells. Equipment and operation technics. Recovery

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	mechanisms outlines. Free-flow production method. Flowing conditions and operation mode selection. Gaslift operation. Gaslift complex. Intra-well gaslift. Operation with deep-well pumps. Deep-well installation. Pumping well equipment. Flow rate of the pump. Operation of electric submersible pumps. Other methods of well operation. Selection of a rational way of well operation. FPM systems, water treatment technics, high-pressure and low-pressure water lines. Foam and gas injection. Production and injection wells maintenance. Well interventions. Well stimulation methods.
Well product gathering and treatment	Gathering systems: individual, cluster, hermetic, with free water knockout or gas extraction. Intra-tube phenomena in gathering systems (emulsifying, oil, gas, water separation, water and gas plugs). Basic processes of oil and associated gas treatment. Waste water treatment. Upgrading of well product. Quality control of input and output product of oil treatment units. Equipping with sampling facilities, organization of infield control of treatment parameters. Quantitative accounting of product to be treated. Sources of technological losses, including unavoidable. Configuration of constructions required for technological process, its verification. Field gathering and treatment of gas and gas-condensate for transportation. Low temperature gas separation. Gas treatment by absorption and adsorption methods. Underground gas storage in depleted oil and gas fields. Construction of underground gas storage in aquifers. Creation of cavern for storage of liquid and gaseous products in salt domes.
Oil & gas field facilities	General conditions and preconditions for design works. Field management plan, and facilities and infrastructure setup plan, relation. Field layouts and possible equipment planning based on existing and advanced equipment and materials. Shale gas and coal bed methane, production technologies and facilities system.
Oil & gas transportation	Oil treatment for transportation by pipeline. Oil pipeline structure. Line pipe. Oil pumping stations. Direct and support equipment. Pumping unit, its characteristics. Tank battery. Shut-off and control equipment. Basic relations defining piping system parameters. Optimization of pipeline system parameters for oil pumping. Oil pipeline operation. Oil pumping modes. Leakage, detection and prevention technics. Midstream operations (batching). Mixing while batching. Mixture layout. Batching cycling. Gas treatment for pipeline transportation. Gas pipeline transportation. Gas pipeline structure. Line pipe. Compression units. Direct and support equipment. Gas compressor unit, its parameters. Basic relations and parameters optimization of gas pipeline system.
Automation of process management system	Engineering of industrial and civil objects integral automation. Elements of process management system. Structure and functions of automatic and automated control systems. Features of petroleum processes as objects of management. Classification of automated control systems (ACS). Functional subsystems. Distributed production objects communication system. Process automation, and production fluid and spec oil metering. Automation of production, transportation an oil, gas, water treatment facilities. Well production

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	rate measurement. Detection of water saturation of oil. Gas and fluid rate measuring (oil, water). Oil production metering at field and in oil &gas production company.
Production safety and HSE while project decisions making	Industrial safety. Conservation of natural resources and environment. Labour safety and safety instructions for petroleum operation.