TECHNICAL
EDUCATION
ACADEMY

School of Engineering

COURSE PROGRAMME

000531

PROD001 – Artificial Lift Systems

In today's rapidly evolving oil and gas industry, the need for proficient knowledge in artificial lift systems is paramount.



Learn from the Best in the Business!

Course overview

Intermediate level

Why take this course

In today's rapidly evolving oil and gas industry, the need for proficient knowledge in artificial lift systems is paramount. Our comprehensive training program is meticulously designed to equip participants with the essential skills and understanding necessary for mastering these systems. The program begins with an "Introduction to Artificial Lift Systems," where learners delve into the basics of artificial lift technology, understand various selection criteria, and analyze economic considerations. This module sets the foundation by exploring reservoir performance, emphasizing well productivity, and addressing formation damage causes and prevention.

Building upon this foundation, the course advances into "Understanding Reservoir Dynamics and Fluid Flow." Here, participants engage with the intricacies of fluid flow fundamentals, including Black Oil PVT and Inflow Performance Relationships, crucial for any professional in this field. We tackle the challenges in well production, discussing problems like asphaltenes, waxes, hydrates, and scale formation, and their impact on lift requirements. This module is pivotal for understanding the changing dynamics of well conditions and how they dictate the necessity for artificial lift.

The heart of the program lies in the "Artificial Lift Systems - Types and Applications" module. Participants are introduced to various systems such as Beam (Rod) Pump Systems, Gas Lift Systems, Electric Submersible Pumps (ESP), and more. The focus is not only on understanding the design and components of each system but also on their practical applications, limitations, and power requirements. This module is vital for grasping the nuances of each system and their suitability for different operational scenarios.

Lastly, the course culminates with "Best Practices and System Optimization." This module synthesizes all the learning into practical applications, emphasizing techniques to maximize oil production economically and ensure the longevity of lift systems. It covers the design and operation under challenging conditions and encourages the application of theoretical knowledge through case studies and real-world scenarios. This final module is designed to transform participants into well-rounded professionals, capable of making informed decisions and optimizing artificial lift systems for maximum efficiency and productivity.

In conclusion, this training program is an invaluable resource for professionals seeking to excel in the artificial lift domain. It offers a blend of theoretical knowledge and practical application, ensuring participants are well-equipped to face the challenges and opportunities in the oil and gas industry.

Who it is for and how it helps

The Artificial Lift Systems training program is ideally suited for a range of professionals in the oil and gas industry who are looking to deepen their understanding and skills in artificial lift technologies. The following groups would particularly benefit from attending this course:

Course overview — continued

- Petroleum Engineers: Engineers who are directly involved in the exploration, development, and optimization of oil and gas wells will find this course particularly beneficial. It will enhance their understanding of how artificial lift systems can maximize production efficiency.
- Production Engineers: These professionals, responsible for managing and optimizing the production of oil and gas wells, will gain valuable insights into the selection, design, and operation of various artificial lift systems.
- Reservoir Engineers: While primarily focused on the subsurface aspects of oil and gas production, reservoir engineers can benefit from understanding how artificial lift impacts reservoir performance and overall production strategy.
- Field Operations Personnel: Supervisors and technicians involved in the day-to-day operations of oil fields will acquire practical knowledge and skills for managing and troubleshooting artificial lift systems.
- Maintenance and Reliability Engineers: Those responsible for the maintenance and reliability of production equipment will gain essential knowledge on maintaining and optimizing artificial lift systems, which are critical for continuous production.
- Project Managers and Planners in Oil and Gas: Managers overseeing projects related to oil extraction will benefit from understanding how artificial lift systems fit into the overall production strategy and affect project economics.
- Technical Support Staff: Technical assistants and support staff involved in production and engineering departments will enhance their understanding of the systems, improving their ability to provide effective support.

By attending this course, these professionals will not only enhance their technical expertise but also contribute to more efficient, cost-effective, and sustainable production operations in their respective organizations.

What you will learn

- Understand Comprehensive Artificial Lift Concepts: Gain a thorough understanding of various artificial lift methods, including their principles, applications, and limitations. This encompasses a deep dive into systems like Sucker Rod Pumping, Gas Lift, Electric Submersible Pumps (ESP), Hydraulic and Jet Pumping, and Progressing Cavity Pumping
- Analyze Reservoir and Fluid Dynamics: Develop the ability to analyze reservoir performance, including understanding inflow and outflow relationships, and the impact of various reservoir conditions on artificial lift system selection and efficiency
- Apply Practical Knowledge to Real-World Scenarios: Utilize the knowledge gained to apply artificial lift technologies in practical settings. This includes the ability to select the appropriate lift system based on specific well conditions and operational requirements
- Design and Optimize Artificial Lift Systems: Acquire the skills to design and optimize various artificial lift systems. This includes understanding the components and operation of each system, troubleshooting common problems, and implementing best practices for maintenance and operation

Course overview — continued

- Make Informed Economic Decisions: Learn to conduct economic analyses for different artificial lift systems, enabling the ability to make informed decisions regarding the most cost-effective and efficient methods for specific scenarios
- Implement Best Industry Practices: Understand and implement the best industry practices for the installation, maintenance, and operation of artificial lift systems, thereby prolonging the life of the equipment and ensuring sustainable operations
- Master Data Interpretation: Gain proficiency in interpreting and utilizing data for diagnosing well and equipment issues, thereby enhancing the ability to make data-driven decisions for system improvement
- Collaborate Effectively in Multidisciplinary Teams: Enhance collaboration skills by working effectively in multidisciplinary teams, sharing insights, and integrating knowledge from different aspects of artificial lift systems for improved operational outcomes

Curriculum

Modules 01–06

01 Overview of Artificial Lift Technology

- Basic concepts and necessity of artificial lift in oil production
- Selection criteria for different lift systems
- Economic analysis considerations

02 Reservoir Performance Overview

- Wellbore and reservoir performance
- Pressure loss in the wellbore
- Well productivity and productivity index
- Inflow and outflow relationships
- Formation damage: causes and prevention

03 Fluid Flow Fundamentals

- Black Oil PVT
- Inflow Performance Relationships
- Nodal Analysis Technology

04 Challenges in Well Production

- Well production problems: asphaltenes, waxes, hydrates, inorganic, scale formation, corrosion
- Impact of changing well conditions on lift requirements

05 Comparison and Selection of Artificial Lift Systems

- Beam (Rod) Pump Systems
- Gas Lift Systems
- Electric Submersible Pumps (ESP)
- Hydraulic and Jet Pumping / Progressing Cavity Pumping Systems

06 Design and Components of Each System

- Surface and Subsurface Equipment
- Power Requirements

Curriculum

Modules 07–12

07 Beam (Rod) Pump Systems: Design and Troubleshooting

- Dynamometers and Troubleshooting
- Optimization strategies
- Designing a Sucker Rod Pump (SRP) System: Exercise

08 Gas Lift Systems: Design, Operation, and Optimization

- Principles of Gas Lift
- Gas Lift Valves
- Intermittent vs. Continuous Systems
- Design and Operations: Exercise

09 Electric Submersible Pumps (ESP): Design and Operational Efficiency

- Applications, Design and Selection
- Installation and Operations
- Troubleshooting and Best Practices
- Designing an ESP System: Exercise

10 Hydraulic, Jet, and Progressing Cavity Pumps

- Concept, Design, and Limitations
- Operating conditions and maintenance best practices
- Selection Criteria
- Designing a PCP System: Exercise

11 Enhancing System Performance

- Best practices for each system
- Techniques to maximize oil production economically
- Design and operation under harsh conditions
- Applying basic design and analysis concepts

12 Practical Applications and Case Studies

- Applying techniques to different scenarios

Curriculum

Module 12 — continued

- Case studies on system selection and design
- Problem-solving exercises

Pre-course requirements

- Educational Background: A basic understanding of engineering principles is essential. Participants should ideally hold a degree in engineering, preferably in petroleum, mechanical, or chemical engineering. This background ensures familiarity with fundamental concepts relevant to oil and gas production
- Industry Experience: Some level of experience in the oil and gas industry, particularly in areas related to production, reservoir management, or field operations, is highly beneficial. This experience allows participants to better understand the practical applications of the concepts taught in the training
- Familiarity with Basic Oil and Gas Concepts: Understanding key terms and concepts related to oil and gas production, such as wellbore dynamics, reservoir properties, and fluid mechanics, will be advantageous. This knowledge aids in grasping more advanced topics covered in the training
- Mathematical Proficiency: Competence in basic mathematics and physics is necessary. Skills in algebra, calculus, and physics principles are important for understanding the technical aspects of artificial lift systems and their design
- Analytical Skills: The ability to analyze and interpret data is crucial, as the course will likely involve working with performance data, production curves, and other technical information
- Computer Literacy: Proficiency in using standard computer software, especially those related to engineering applications, is helpful. Familiarity with industry-specific software for modeling and analysis would be an added advantage

Participation and contacts

Joining the programme

Contact the Academy and quote course code 000531 to confirm dates, delivery format, prices and enrolment terms.

Training for your team

Tell us your business goals, the roles and number of participants, and your preferred dates and location. This will help us discuss the right training option.

Preparing for the programme

Read the pre-course requirements in this programme before enrolling.

Discuss your training needs

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