# Introduction

This **comprehensive Mini-Master Course in Hydrocarbon Production Operations** is designed to provide participants with a thorough understanding of hydrocarbon production processes and associated facilities throughout the reservoir's lifecycle.

The course offers in-depth insights into oilfield production handling and treatment equipment while focusing on the fluid properties and their behavior from the reservoir to the end user. Additionally, it emphasizes reserve calculations, fluid dynamics, and surface facility design, enabling participants to manage production operations effectively.

### Hydrocarbons in Oil and Gas

Participants will explore the foundational role of hydrocarbons in the oil and gas industry, discussing their significance, production processes, and the complex operations involved in their journey from reservoir to consumer.

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# Target Audience

This course is tailored for:

- **Technologists** looking to deepen their understanding of hydrocarbon production.
- **Mechanical Engineers** involved in the design and maintenance of production facilities.
- **Safety and Inspection Engineers** responsible for operational safety and compliance.
- **Operations, Maintenance, and Project Engineers** engaged in hydrocarbon projects.
- **Professionals** seeking a broad understanding of oil and gas industry structure, operations, and economics.

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# Course Objectives

Upon completing this training, participants will:

- Analyze global oil and gas statistics, including reserves, production, consumption, and exports.
- Understand upstream, midstream, and downstream operations and their respective facilities.
- Master exploration, drilling, production, treatment, and transportation techniques.
- Grasp oil and gas operations within field facilities, including separators, compressors, and pipelines.
- Evaluate oil and gas reserves and explore artificial lift and recovery

enhancement methods.
- Address challenges such as offshore operations, horizontal drilling, and safety considerations.
- Develop a foundational understanding of petroleum economics and risk management.

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## Targeted Competencies

Participants will enhance their abilities to:

- Apply petroleum economics to evaluate field development projects.
- Optimize recovery through the role of petroleum and reservoir engineering.
- Understand oil and gas processing technologies across upstream and downstream sectors.
- Evaluate the industry value chain from wellhead to consumer.
- Navigate organizational structures for effective industry operations.
- Make informed decisions regarding hydrocarbon production and processing.

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## Course Content

### Unit 1: Introduction and Overview

- Global energy statistics.
- Components of the hydrocarbon industry.
- Upstream operations:
  - Exploration methods.
  - Seismic surveys.
  - Drilling operations and associated challenges.
- Testing, completion, and hydrocarbon production challenges.
- Well stimulation and maintenance techniques.

### Unit 2: Hydrocarbon Properties

- Rock properties: porosity and permeability.
- Estimation of hydrocarbon reserves.
- Oil and gas production methodologies.
- Artificial lift systems and facilities.
- Reservoir drive mechanisms and pressure maintenance technologies.
- Recovery methods: primary, secondary, and tertiary.
- Reservoir simulation techniques.
- Overview of surface facilities for oil and gas fields.

### Unit 3: The Downstream Operations

- Overview of wellhead types and production manifolds.
- Gas-Oil Separation Plant (GOSP) facilities:
  - Oil and gas separation.

    - Emulsion treatment.
    - Separator types and troubleshooting.
- Oil treatment, storage, and transportation:
    - Oil tank types.
    - Gas treatment and processing methods.
    - Troubleshooting common processes.

## Unit 4: Heat Exchangers and Operational Equipment

- Oil and gas measurement and control systems.
- Pipeline operations and pigging processes.
- Overview of valve types and their applications.
- Pump and compressor station operations.
- Refinery operations and product management.
- Troubleshooting operational challenges.

## Unit 5: The Role of Technology

- Safety and accident prevention strategies.
- Production problem mitigation techniques.
- Corrosion and cathodic protection systems.
- Scale prevention and treatment methods.
- Insights into petroleum economics and risk analysis.