

Who Should Attend?

This course, the "Campbell Gas Course™", has been the standard of the industry for well over thirty (30) years. It deals with the practical planning, design, specification and operation of gas processing and production systems. Over 20,000 engineers have attended our G-4 program, considered by many to be the most practical and comprehensive course in the oil and gas industry.

This version of the "Campbell Gas Course" is directed to the LNG industry and in particular, base load plants.

The LNG version of the G-4 is designed for technical, production and processing personnel. The G-4LNG course emphasizes the practical choice of processes and equipment. Operating issues, performance evaluation and control systems are also discussed. This program has been presented several times for eight of the world's base load LNG plants, in Australia, Nigeria, Trinidad, Malaysia, Indonesia, Japan and the Middle East.

The Participant Will Learn How To:

- Select and evaluate processes used to dehydrate natural gas, meet hydrocarbon dewpoint specifications and extract NGLs
- Analyze Propane Refrigeration, Mixed Refrigerants, LNG Liquefaction Cycles
- Apply physical/thermodynamic property correlations and principles to the design and evaluation of LNG gas processing facilities
- Perform and review equipment sizing correlations for major process equipment
- Recognize and develop solutions to operating problems and control issues in gas processing facilities
- Evaluate LNG gas treatment including CO₂/H₂S removal with Amines, Sulfinol®, Hot Potassium Carbonate, etc.

Course Outline

DAY 1	<p>TOPICS</p> <p>Introduction to gas processing systems and options; LNG; physical properties of hydrocarbon fluids; and phase behavior.</p> <ul style="list-style-type: none"> • Course Introduction • Gas Processing Systems and LNG • Physical Properties of Hydrocarbons • Qualitative Phase Behavior 	DAY 6	<p>TOPICS</p> <p>Pump principles; power and head; NPSHR vs. NPSHA; evaluation of pump performance and system curves; positive displacement and centrifugal pumps; pump control. Principles of compression including reciprocating and centrifugal compressors, power consumption, performance curves, axial compressors, compressor drivers and compressor control.</p> <ul style="list-style-type: none"> • Pumps • Compressors
DAY 2	<p>TOPICS</p> <p>Principles of vapor-liquid equilibrium; K-values; dewpoints; bubblepoints; flash calculations; water content of natural gas; and hydrates.</p> <ul style="list-style-type: none"> • Vapor-Liquid Equilibrium • Water-Hydrocarbon Behavior 	DAY 7	<p>TOPICS</p> <p>Principles of refrigeration including pressure vs. enthalpy charts; basic simple refrigeration cycle; economizer systems; power consumption, condenser load; mixed refrigerants; LNG liquification processes; LTS/LTX processes; and turboexpanders.</p> <ul style="list-style-type: none"> • Refrigeration
DAY 3	<p>TOPICS</p> <p>Hydrate inhibition with glycols and alcohols; energy balances; enthalpy/entropy; tables of data; and general correlations for enthalpy and entropy.</p> <ul style="list-style-type: none"> • Water-Hydrocarbon Behavior (Cont'd) • Basic Thermodynamic TOPICS • System Energy Changes 	DAY 8	<p>TOPICS</p> <p>Mass transfer fundamentals; fractionator operation, design and specification; minimum reflux; theoretical plates; overall efficiency; energy balances; oil stabilizers; and scrub column.</p> <ul style="list-style-type: none"> • Fractionation/Distillation • Dehydration
DAY 4	<p>TOPICS</p> <p>Control modes (proportional, integral, derivative); valve characteristics; flow measurement; examples of control application. Pressure vessel design; principles of separation; vessel sizing - vertical and horizontal, two/three phase; mist extraction; internals and specification. Fundamentals of heat transfer.</p> <ul style="list-style-type: none"> • Process Control Fundamentals • Separation Equipment 	DAY 9	<p>TOPICS</p> <p>Properties of desiccants; molecular sieves, etc.; operation and design of adsorption dehydration systems; sizing tower; regeneration requirements; and overview of glycol dehydration.</p> <ul style="list-style-type: none"> • Dehydration (Cont'd) • Gas Pretreatment
DAY 5	<p>TOPICS</p> <p>Heat Exchangers - design and specification; shell and tube; plate; plate-fin; spiralwound; heaters; cooling towers, and aerial coolers.</p> <ul style="list-style-type: none"> • Heat Transfer 	DAY 10	<p>TOPICS</p> <p>LNG gas pretreatment; Amines, Sulfinol®, Hot Potassium Carbonate, CO₂/H₂S removal; principles and operating problems; residual CO₂ levels; trace sulfur and mercury removal.</p> <ul style="list-style-type: none"> • Gas Pretreatment (Cont'd) • Course Overview and Summary