

PETROLEUM ENGINEERING

Petroleum engineering is a field of [engineering](#) concerned with the activities related to the production of [Hydrocarbons](#), which can be either [crude oil](#) or [natural gas](#).^[1] Exploration and production are deemed to fall within the [upstream](#) sector of the oil and gas industry. [Exploration](#), by [earth scientists](#), and petroleum engineering are the oil and gas industry's two main subsurface disciplines, which focus on maximizing economic recovery of hydrocarbons from subsurface reservoirs. [Petroleum geology](#) and [geophysics](#) focus on provision of a static description of the hydrocarbon reservoir rock, while petroleum engineering focuses on estimation of the recoverable volume of this resource using a detailed understanding of the physical behavior of oil, water and gas within porous rock at very high pressure.

The combined efforts of [geologists](#) and petroleum engineers throughout the life of a hydrocarbon accumulation determine the way in which a reservoir is developed and depleted, and usually they have the highest impact on field economics. Petroleum engineering requires a good knowledge of many other related disciplines, such as geophysics, petroleum geology, [formation evaluation](#) ([well logging](#)), [drilling](#), [economics](#), [reservoir simulation](#), [reservoir engineering](#), well engineering, [artificial lift](#) systems, completions and [petroleum production engineering](#).

Recruitment to the industry has historically been from the disciplines of [physics](#), [mechanical engineering](#), [chemical engineering](#) and [mining engineering](#). Subsequent development training has usually been done within oil companies.

The profession got its start in 1914 within the [American Institute of Mining, Metallurgical and Petroleum Engineers](#) (AIME). The first Petroleum Engineering degree was conferred in 1915 by the [University of Pittsburgh](#).^[2] Since then, the profession has evolved to solve increasingly difficult situations. Improvements in computer modeling, materials and the application of statistics, probability analysis, and new technologies like [horizontal drilling](#) and [enhanced oil recovery](#), have drastically improved the toolbox of the petroleum engineer in recent decades. Automation,^[3] sensors,^[4] and robots^{[5][6]} are being used to propel the industry to more efficiency and safety.

Deep-water, arctic and desert conditions are usually contended with. High temperature and high pressure (HTHP) environments have become increasingly commonplace in operations and require the petroleum engineer to be savvy in topics as wide-ranging as thermo-hydraulics, geomechanics, and intelligent systems.