



# NATURAL GAS ENGINEERING

## PROF. PANKAJ TIWARI

Department of Chemical Engineering  
IIT Guwahati

**INTENDED AUDIENCE** : Under graduate and post graduate students professional practitioner in the discipline of Chemical Engineering, Petroleum Engineering, Mechanical Engineering, Energy

**PRE-REQUISITES** : Bachelor Degree in any Engineering discipline

**INDUSTRIES APPLICABLE TO** : Petroleum Industries/companies: ONGC, OIL, GAIL, IOCL, etc.

## COURSE OUTLINE :

The field of natural gas engineering is very much important for petroleum engineers specializing in gas processing technology. The course outlines an optimal balance between natural gas production, natural gas processing and gas transportation. An extensive treatise on natural gas engineering, both upstream and gas refining processes with key equipment and facility design will be covered. This course will also highlight the current status of production of natural gas through unconventional sources/technics and the applications of natural gas.

## ABOUT INSTRUCTOR :

Prof. Pankaj Tiwari is serving as Assistant Professor in the Department of Chemical Engineering at Indian Institute of Technology Guwahati since Aug 2012. He has received doctoral degree from University of Utah, USA (2012) and Master of Technology from Indian Institute of Technology Kanpur, India (2006). He also worked at General Electric, Plastic division at JFWTC Bangalore (2007) on developing the monomer for high performance polymer (HPP). He has taught Natural Gas Engineering as an elective course to UG, PG and PHD students at IIT Guwahati for three consecutive years (2013, 2014 and 2015).

## COURSE PLAN :

**Week 01** : Introduction, Gas Production: Upstream, Reservoir- Well Completion

**Week 02** : Properties of Natural Gas: Phase Behavior

**Week 03** : Well inflow performance relationship (IPR), Skin factor, Productivity Index, Gas well testing  
Deliverability : Nodal Analysis.

**Week 04** : Wellbore Performance: TPR Curve, Single Phase & Multi Phase flow, Choke Performance: CPR Curve, Sonic and Subsonic Flow, Well Deliverability: Nodal Analysis

**Week 05** : Natural Gas Production: Downstream, Surface Facilities, Principle of Separator, Design of Separator: Vertical, Horizontal; Two Phase Separation, Three Phase Separation

**Week 06** : Natural Gas Processing: Dehydration of Natural Gas, Design of Dehydration, Sweetening Processes,  
Compressor design and energy calculation

**Week 07** : Transportation and Measurement, Pipeline Design

**Week 08** : Flow through pipeline, issues and solutions, Unconventional Production of Natural Gas: Shale Gas, Gas Hydrates, Coal bed Methane, Oil Shale, Pyrolysis of Carbonaceous Materials etc..