

MODULE INFORMATION SHEET

Name of Module Unit	Natural Gas Engineering
Name in polish language	Inżynieria gazownictwa
Module type	compulsory / elective
Form of studying	full-time day courses
Level of study	undergraduate course (B.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environmental Engineering
Responsible department	District Heating and Gas Systems Department
Responsible person	Maciej Chaczykowski, D.Sc. PhD

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
6	15			30		3

Objectives (summary)

The subject gives students an overview of selected fields of natural gas engineering. The subject matter is balanced and focused on natural gas midstream operations. Topics include: gas transmission and distribution, LNG technologies, storage and utilization. Natural gas sales and market development is also discussed. After completing the course, the student should:

- Be familiar with natural gas network and grid infrastructure
- Understand the liquefaction processes and facilities
- Describe natural gas and LNG markets and supply chains.
- Understand underground gas storage facilities and processes
- Be familiar with gas to power technologies

Prerequisites

1. Basic knowledge of thermodynamics, heat transfer and fluid mechanics
2. Ability to interpret and present results

Rules for integrated grade definition

Exam 60% and project 40%.

Recommended readings

1. X. Wang and M. Economides. Advanced Natural Gas Engineering, Gulf Publishing Company, 2010.
2. V. Smil. Natural Gas: Fuel for the 21st Century, John Wiley & Sons, 2015.
3. S. Mokhatab, W. Poe, J. Mak Handbook of Natural Gas Transmission and Processing, Gulf Professional Publishing, 2018.
4. S. Mokhatab, J. Mak, J. V. Valappil, D. A. Wood, Handbook of Liquefied Natural Gas, Gulf Professional Publishing, 2016

Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1.	Natural gas resources	1	S
2.	Natural gas pipeline systems	2	S
3.	Pipeline hydraulics and thermal analysis	2	S
4.	Pressure regulator station and compressor station sizing calculations	2	S
5.	Flow metering and custody transfer operations	1	S
6.	LNG shipping technologies and processes	1	S
7.	Natural gas transport optimization case studies.	2	S
8.	Natural gas end use applications, incl. gas to power (CCGT/CHP plants)	2	S
9.	Natural gas storage	1	S
10.	Renewable gas production, power-to-gas technologies	1	Ex
Total		15	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Lecturers

Maciej Chaczykowski D.Sc. PhD, Ferdinand Uilhoorn D.Sc, PhD

Assessment method

Written examination

Contents of computer exercises

	Topics	Time (hrs.)	Scope (S / Ex)
1	Design calculations of selected natural gas supply chain elements	20	
2	Design calculations and sizing of selected energy systems using software package, e.g. gas fired power plants.	10	
Total		30	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Persons responsible for computer exercises

Łukasz Kotyński PhD

Assessment method for computer exercises

Conducting a project. Report with problem formulation, assumptions, method of solution, results and conclusions