

Course unit title:	Fundamentals of pipeline design		
Course unit code:	OG 402		
Type of course unit:	Compulsory – Oil and Gas Stream		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	3		
Semester when the unit is delivered:	5 (Fall)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Paris Fokaides		
Learning outcomes of the course unit:	<ol style="list-style-type: none"> 1. Elemental analysis of pipeline design for natural gas transportation 2. Equations used for calculation of pressure drop due to friction 3. Piping in series and in parallel analysis 4. Compressor stations versus pipe loops 5. Computational Applications 		
Mode of delivery:	Face-to-face		
Prerequisites:		Co-requisites:	None
Recommended optional program components:	None		
Course contents:	<p>Module 1: Pressure drop due to friction</p> <ul style="list-style-type: none"> ▪ Ideal and real gases ▪ General flow equation ▪ Colebrook-white plain and modified equation ▪ Panhandle A and B equation ▪ Comparison of flow equations <p>Module 2: Pressure required to transport</p> <ul style="list-style-type: none"> ▪ Frictional effect ▪ Effect of pipeline elevation ▪ Piping in series and in parallel ▪ Locating pipe loops <p>Module 3: Compressor Stations</p> <ul style="list-style-type: none"> ▪ Compressor stations locations ▪ Hydraulic balance ▪ Isothermal, adiabatic and polytropic compression ▪ Compressor performance curves <p>Module 4: Pipe analysis</p> <ul style="list-style-type: none"> ▪ Pipe wall thickness ▪ Barlow's equation ▪ Pipe material and grade ▪ Class location <p>Module 5: Valves and flow measurements</p> <ul style="list-style-type: none"> ▪ Purpose and types of valves ▪ Codes for design and construction ▪ Flow measurement ▪ Flow meters <p>Module 6: Mass and Energy Balance Laboratory Exercises</p> <ul style="list-style-type: none"> ▪ Laboratory Exercise 1: Aspen Plus – Performance of a pump ▪ Laboratory Exercise 2: Aspen Plus – Performance of a compressor ▪ Laboratory Exercise 3: Aspen Plus – Pipes performance ▪ Laboratory Exercise 4: Aspen Plus – Compressor station sizing 		
Recommended and/or required reading:	Menon, E. S. (2005). Gas pipeline hydraulics. CRC Press		
Textbooks:	<ul style="list-style-type: none"> ▪ E.W. McAllister (Author), "Pipeline Rules of Thumb Handbook" (2013) 		

References:	<ul style="list-style-type: none"> ▪ E. Shashi Menon (Author), "Pipeline Planning and Construction Field Manual" (2011) ▪ Thomas O. Miesner (Author), William L. Leffler (Author), "Oil & Gas Pipelines in Nontechnical Language (2006)
Planned learning activities and teaching methods:	<p>The taught part of course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the web for students to use in combination with the textbooks.</p> <p>Lectures are supplemented with laboratory sessions with aim to get acquainted with lab equipment and instruments for measuring temperatures, specific heat capacities, thermal conductivities and other thermal properties.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> • Tests: 25% • Laboratory Work: 25% • Final Exam 50%
Language of instruction:	English
Work placement(s):	No