

<b>Course Unit Title</b>	<b>ASOG 402 Fundamentals of pipeline design</b>
<b>Programme of study</b>	BSc in Mechanical Engineering
<b>Lecturer</b>	Dr.-Ing. Paris A. Fokaides
<b>Type of course unit</b>	Compulsory (for Oil and Gas Engineering Stream)
<b>ECTS</b>	5
<b>Year of study:</b>	3
<b>Semester(s) offered</b>	Spring Semester 2016, 2018, 2021, 2022
<b>Course content</b>	<ul style="list-style-type: none"> <li>▪ Elemental analysis of pipeline design for natural gas transportation</li> <li>▪ Equations used for calculation of pressure drop due to friction</li> <li>▪ Piping in series and in parallel analysis</li> <li>▪ Compressor stations versus pipe loops</li> <li>▪ Computational Applications</li> </ul>
<b>Course modules:</b>	<p><u>Module 1: Pressure drop due to friction</u></p> <ul style="list-style-type: none"> <li>▪ Ideal and real gases</li> <li>▪ General flow equation</li> <li>▪ Colebrook-white plain and modified equation</li> <li>▪ Panhandle A and B equation</li> <li>▪ Comparison of flow equations</li> </ul> <p><u>Module 2: Pressure required to transport</u></p> <ul style="list-style-type: none"> <li>▪ Frictional effect</li> <li>▪ Effect of pipeline elevation</li> <li>▪ Piping in series and in parallel</li> <li>▪ Locating pipe loops</li> </ul> <p><u>Module 3: Compressor Stations</u></p> <ul style="list-style-type: none"> <li>▪ Compressor stations locations</li> <li>▪ Hydraulic balance</li> <li>▪ Isothermal, adiabatic and polytropic compression</li> <li>▪ Compressor performance curves</li> </ul> <p><u>Module 4: Pipe analysis</u></p> <ul style="list-style-type: none"> <li>▪ Pipe wall thickness</li> <li>▪ Barlow's equation</li> <li>▪ Pipe material and grade</li> <li>▪ Class location</li> </ul> <p><u>Module 5: Valves and flow measurements</u></p> <ul style="list-style-type: none"> <li>▪ Purpose and types of valves</li> <li>▪ Codes for design and construction</li> <li>▪ Flow measurement</li> <li>▪ Flow meters</li> </ul> <p><u>Module 6: Mass and Energy Balance Laboratory Exercises</u></p> <ul style="list-style-type: none"> <li>▪ Laboratory Exercise 1: Aspen Plus – Performance of a pump</li> <li>▪ Laboratory Exercise 2: Aspen Plus – Performance of a compressor</li> <li>▪ Laboratory Exercise 3: Aspen Plus – Pipes performance</li> <li>▪ Laboratory Exercise 4: Aspen Plus – Compressor station sizing</li> </ul>
<b>Textbooks:</b>	Menon, E. S. (2005). Gas pipeline hydraulics. CRC Press.
<b>Instruction language</b>	English
<b>External reference</b>	<a href="#">link</a>