

Course Title	Machine Elements and Machines in Oil and Gas Industry				
Course Code	OG301				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	3 <sup>rd</sup> Year / 6 <sup>th</sup> Semester				
Teacher's Name	Dr. Antonios Lontos				
ECTS	6	Lectures / week	3	Laboratories/week	1
Course Purpose	The purpose of the course is to learn how calculate various machine elements using established procedures, select machines elements from a wide variety of libraries and finally how to design real engineering mechanisms or machines.				
Learning Outcomes	<p>By the end of the course, students must be able to:</p> <ol style="list-style-type: none"> <li>1. Design and calculate gears. Calculate forces on gears.</li> <li>2. Design and calculate spur and helical gears.</li> <li>3. Design and calculate bevel and worm gears.</li> <li>4. Design and calculate mechanical springs (load, stresses, selection of material). Apply mechanical springs on machines and engineering mechanisms.</li> <li>5. Calculate clutches and brakes.</li> <li>6. Calculate and design power transition systems using belts.</li> <li>7. Calculate roller chains, wire ropes, flexible shafts.</li> </ol>				
Prerequisites	ME316	Corequisites	None		
Course Content	<ul style="list-style-type: none"> <li>• Various types of Gear: – General, Introduction to gears, Types of gears, Tooth system, Contact ratio, Force analysis, Applications of gear design and power transmission in mechanical drives.</li> <li>• Spur and Helical Gears: Calculations, Force analysis, stresses, strains, geometry, applications, drawings.</li> <li>• Bevel and Worm Gears: Calculations, Force analysis, stresses, geometry, applications.</li> <li>• Mechanical Spring: Various types and applications of springs, Stresses in helical springs, Deflection of helical springs, Extension and Compression springs, Springs material, Fatigue loading, Design of springs, Miscellaneous springs.</li> </ul>				

	<ul style="list-style-type: none"> <li>• Clutches and Brakes Brake: Geometry and operations analysis, Band-type clutches and brakes, Energy consideration, Temperature rise, Friction materials.</li> <li>• Power transmission components: Competition of the design of a power transmission, Flat belts, Roller chain, Wire rope, Flexible shaft.</li> <li>• Laboratory work: Use of special software for calculating and drawing of various machine element (Autocad, 3D Drawings, Advanced assembly, SolidWorks, Simple Drawings and FEM Simulations, Software for machine elements calculations)</li> </ul>
Teaching Methodology	<p>Lectures, laboratories and tutorials are used in this subject and assignments are performed to evaluate the students understanding of the subject matter. A description is given at the beginning of the course in order for the students to get enough information on the main subjects of the course</p>
Bibliography	<p>(a) <u>Textbooks:</u></p> <ul style="list-style-type: none"> <li>• Fundamentals of Machine Elements, B. J. Hamrock, B. Jacobson, S. R. Schmid, Mcgraw-Hill</li> </ul> <p>(b) <u>References:</u></p> <ul style="list-style-type: none"> <li>• Mechanical Engineering Design, Ch. R. Mischke, J. Edward Shigley, McGraw-Hill</li> <li>• Mechanical Design, An Integrated Approach, Ansel C. Ugural, Mcgraw Hill, 2004.</li> <li>• Design of Machine Elements and Machines, Jack A. Collins, George H. Staab, Henry R. Busby, John Wiley &amp; Sons, 2002</li> <li>• Mechanisms and mechanical devices by Neil Clater, Nichocals P. Chironis, Third Edition 2001</li> <li>• Fundamental of Machines Components Design, Robert C. Juvinall, Kurt M. Marshek, Third Edition, 2000</li> <li>• Machine Design: An Integrated Approach by Robert L. Norton, Robert L Norton, Prentice Hall, 2nd edition, 2000</li> <li>• Machine Elements in Mechanical Design by Robert L. Mott, Prentice Hall, 3rd edition, 1998</li> </ul>
Assessment	<p>The assessment consists of following methods for both the theoretical and practical part of the course. Each assessment method is assigned with a weight which is used for the calculation of the final grade.</p> <p style="text-align: center;">Assignments: 40% Final Exam: 60%</p>
Language	English