

Course unit title:	Machine Elements and Analysis I		
Course unit code:	AU308		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (2st Cycle)		
Year of study:	3		
Semester when the unit is delivered:	5 (Spring)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Antonios Lontos, Unit leader: Dr. Sotiris Omirou		
Learning outcomes of the course unit:	<ul style="list-style-type: none"> <li>• Explain general mechanical concepts related to machine elements.</li> <li>• Analyse loads, stresses and deformation. Explain theories about failure and fatigue of machine components.</li> <li>• Calculate machine elements loaded under static or dynamic loading.</li> <li>• Design machine component on shafts. Make calculation for the selection of proper shafts.</li> <li>• Design and calculate bearings. Select proper bearing for machines.</li> <li>• Design and calculate screws and fasteners.</li> <li>• Calculate welds and select proper welding parameters.</li> <li>• Design and calculate cams and flywheels.</li> </ul>		
Mode of delivery:	Face-to-face		
Prerequisites:	AU201	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	<ul style="list-style-type: none"> <li>• <b>General concepts on machine design:</b> General concepts on machine design and vehicle mechanics, Stress and strength, stress concentration, Static strength, Plastic deformation.</li> <li>• <b>Static and dynamic loading of machine elements</b> Fatigue, Theories of failure, Failure prevention, Static and dynamic strength of vehicle machine elements.</li> <li>• <b>Engineering shafts</b>, Crankshaft, Shaft material and critical speeds, Vehicle axles, Keys and Couplings.</li> <li>• <b>Vehicle Bearings:</b> Bearing types and applications, Lubrication and seals, Bearing load and life, Selection of ball and cylindrical roller bearing for vehicles.</li> <li>• <b>Mechanical connections:</b> Calculation and applications of bolted connections, Bolt strength, Screws and Fasteners, Fasteners stiffness. Vehicle applications.</li> <li>• <b>Welded and bonded Joints:</b> Calculation of welded and bonded Joints, Welding symbols, Stresses in welding, Static and fatigue loading, Specifications.</li> <li>• <b>Cams and flywheels:</b> Calculation of cams and flywheels and applications</li> <li>• <b>Laboratory work:</b> 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>		
Recommended and/or required reading:	None		
Textbooks:	• Mechanical Engineering Design, Ch. R. Mischke, J. Edward Shigley,		

	<ul style="list-style-type: none"> <li>McGraw-Hill Fundamentals of Machine Elements, B. J. Hamrock, B. Jacobson, S. R. Schmid, McGraw-Hill</li> </ul>
References:	<ul style="list-style-type: none"> <li>Design of Machine Elements and Machines by Jack A. Collins, George H. Staab, Henry R. Busby, John Wiley &amp; Sons, 2002</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>
Planned learning activities and teaching methods:	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.
Assessment methods and criteria:	<ul style="list-style-type: none"> <li>Assignments: 40%</li> <li>Final Exam: 60%</li> </ul>
Language of instruction:	English
Work placement(s):	No