

Course unit title:	Introduction to mechanical engineering with workshop		
Course unit code:	AMEM112		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1 st Cycle)		
Year of study:	1		
Semester when the unit is delivered:	1 (Fall)		
Number of ECTS credits allocated :	5		
Name of lecturer(s):	Dr. George Karagiorgis, Mr Charalambos Athanasiou, Mr Simos Markitanis		
Learning outcomes of the course unit:	<ol style="list-style-type: none"> 1. Appreciate the major sectors of mechanical engineering 2. Understand the basic principles of various fields of mechanical engineering. 3. Perform simple calculations to various fields of mechanical engineering. 4. Understand basic physical concepts. 5. Appreciate the types of materials and their mechanical properties. 6. Appreciate the use of computer on every day engineering activities. 7. Explain of the role of measurements in engineering design and manufacturing. Describe the types and sources of errors in measurements. Use metric and imperial system of length measuring units. 8. Use line graduated instruments: machinist's rule, vernier calliper, micrometer. Describe the accuracy of each instrument and select the appropriates depending on the quality needs. 9. Describe the main features, controls, structure and cutting tools of lathes and milling machines. Define basic cutting parameters (cutting speed, depth of cut, feed rate). Operate a lathe and milling machine for cutting a representative workpiece. 10. Describe principles of welding and typical welding processes such as arc welding with coated electrodes, TIG, MIG, induction welding, resistance welding, gas welding. 		
Mode of delivery:	Face-to-face		
Prerequisites:	None	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	<p>Introduction to Mechanical Engineering: The Sectors Production Engineering (Materials Technology, Manufacturing Processes, Production Systems, CAD/CAM/CAE, etc), Structural Engineering (Machine Elements, Engineering Design, Controls, Dynamics of Machines, Robotics, etc), Energy (Thermodynamics, Fluids, Heat and Mass Transfer, Gas Turbines, etc)</p> <p>Basic Physical Concepts: Codes and standards, Units, rules for use of SI Units, preferred Units, Force and its units, Forces in equilibrium, resultant of a system of forces, Moment of a force, Conditions for static equilibrium, Center of mass, centroids</p> <p>Thermodynamics: Heat, work, and system, The state of a working fluid, Reversibility Reversible work.</p> <p>Fluids: Pressure, Manometers ,Continuity equation, Bernoulli's equation</p> <p>Introduction to Computer Technology: Introduction to MS-Office (MS-Word, MS-Excel, Powerpoint), Use of the Internet and e-</p>		

	<p>mail</p> <p>Engineering measurements: Importance of measurements in engineering design and manufacturing. Types of errors in measurements / sources of errors, units in metric and imperial system, conversions between the two systems. Measurement of linear dimensions, Line graduated instruments: Machinist's rule, vernier caliper, micrometer (mechanic & digital), description, mode of use, accuracy, applications.</p> <p>Lathes and turning processes: Main features and controls of lathes. Lathe structure (models, typical structural parts, power raw, most significant dimensions), Cutting tools (structural material, tool geometry, tool selection method, Cutting fluids). Basic cutting parameters (cutting speed, depth of cut, feed rate). Safety precautions. Performance on face turning and cylindrical surface turning. Performance on thread cutting, hole drilling, slot cutting and non symmetrical lathe cutting. Cutting forces experimental estimation for various cutting parameters.</p> <p>Milling machines and milling operations: Main features and controls of milling machines. Horizontal and vertical milling machines. Milling machine structure (models, typical structural parts, power raw, most significant dimensions), Milling tool properties (structural material, tool geometry, tool models, tool selection method). Basic milling parameters (cutting speed, depth of cut, feed rate). Performance of slab or face milling and slot milling (up milling and down milling). Gear cutting performance using a milling machine.</p> <p>Welding: Principles of fusion welding (modes of metal transfer, heat flow, metalographic characteristics of welded joint). Typical welding processes (arc welding with coated electrodes, TIG, MIG, induction welding, resistance welding, gas welding), Safety precautions. Performance of arc welding using coated electrodes for various welding parameters (welding material properties and dimensions, coated electrode material and dimensions, welding current, welding polarity). Performance of gas welding method using various welding parameters. Permanent stress and strain in welding structures.</p>
Recommended and/or required reading:	
Textbooks:	<p>Fundamentals of Modern Manufacturing: Materials, Processes, and Systems by Mikell P. Groover, John Wiley & Sons, 3rd edition 2007</p> <p>Applied Thermodynamics for Engineering Technologists by T.D. Eastop and A. McConkey, Longman, 1997</p> <p>Fundamentals of Fluid Mechanics by Donald F. Young, Theodore H. Okiishi, Bruce Roy Munson: John Wiley & Sons, 4th edition, 2002</p>
References:	<p>Manufacturing Processes for Engineering Materials, by Serope Kalpakjian, Steven R. Schmid, Prentice Hall, 2003.</p>
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>Computer laboratories are used in this subject and assignments are performed to evaluate the students understanding of the subject matter</p> <p>Lectures to learn about specific topics such as form measurements, machining principles, cutting conditions, welding principles etc. Hands-on training on the equipment of a mechanical workshop (measurement instruments, cutting machines, welding machines, etc.)</p> <p>Visits to modern workshops of the local industry.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> • Test 50% • Laboratory work 50%
Language of instruction:	English
Work placement(s):	No

