Course Title	Introduction to mechanical engineering with workshop				
Course Code	ME112				
Course Type	Compulsory				
Level	BSc (Level 1)				
Year / Semester	1st Year / 1st Semester				
Teacher's Name	Dr. George Karagiorgis Mr Charalambos Athanasiou, Mr Simos Markitanis				
ECTS	5	Lectures / week	3	Laboratories/week	3
Course Purpose	The course purpose is to provide students with the necessary fundamental knowledge needed for their studies and lay a solid foundation for the more advance courses. Upon completion of this course, the students will be able to understand the basics of Mechanical Engineering, furthermore they will gain actual experience related to Mechanical Engineering workshops.				
Learning Outcomes	**By the end of the course, students must be able to:** 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.				

Prerequisites	**None**	Corequisites	**None**
Course Content	**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) **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 **Thermodynamics:** Heat, work, and system, The state of a working fluid, Reversibility Reversible work. **Fluids:** Pressure, Manometers ,Continuity equation, Bernoulli's equation **Introduction to Computer Technology:** Introduction to MS-Office (MS-Word, MS-Excel, Powerpoint), Use of the Internet and e-mail **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. **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. **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. **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.
Teaching Methodology	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. Computer laboratories are used in this subject and assignments are performed to evaluate the students understanding of the subject matter 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.) Visits to modern workshops of the local industry.
Bibliography	1. Heating and Cooling of Buildings: design for efficiency, by Kreider, Jan F, Curtiss, Peter S, Mc Graw-Hill 2010. 2. Faye C. McQuiston, Jeffrey D. Spitler, Jerald D. Parker, “Heating, Ventilating, and Air Conditioning: Analysis and Design”, Fifth Edition, John Wiley & Sons, 2000. 3. Andrew Parr, “Air Conditioning Principles and Systems: An Energy Approach”, Fourth edition Edward G. Pita Prentice Hall, 2001. 4. 2011 ASHRAE Handbook Heating Ventilating and Air-Conditioning applications. 5. Modern Refrigeration and Air conditioning - study guide by Althouse Andrrew B; Turnquist Carl published by Goodheart (Illinois), 2004 isbn:1590702816.
Assessment	• Laboratories 50% • Tests 50%
Language	English