

Course unit title:	CAD/CAM Technology in Automotive Engineering		
Course unit code:	AU407		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	3		
Semester when the unit is delivered:	6 (Spring)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Sotiris Omirou		
Learning outcomes of the course unit:	<ol style="list-style-type: none"> <li>1. Describe the principles of various manufacturing processes, manufacturing technology, material removal and optimization of cutting processes.</li> <li>2. Describe the capabilities of general computer aided designing systems and CAD systems for designing automotive parts and dies of automotive parts in 2D and 3D dimensions.</li> <li>3. Use effectively CAD / CAM systems in order to produce the final NC code for the manufacturing of various automotive parts and carry out exchange of data between CAD and CAM systems.</li> <li>4. Compare and contrast the operation and programming of a CNC machine tool using manual programming and a CAM system.</li> <li>5. Evaluate through computer-assisted simulation, the differences between file types of several CAM systems.</li> <li>6. Generate the G-code program for a series of automotive parts using advanced programming capabilities (canned cycles, subprogramming, coordinate transformations, parameters).</li> <li>7. Generate basic and advanced CNC programs from imported CAD data using several CAM systems.</li> </ol>		
Mode of delivery:	Face-to-face		
Prerequisites:	ME113, ME201	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	<ul style="list-style-type: none"> <li>• <b>Introduction to modern manufacturing technology:</b> Principles of various manufacturing processes, material removal, optimization of cutting processes using flexible manufacturing systems.</li> <li>• <b>CAD Systems:</b> Principles of computer aided designing systems, CAD systems for designing automotive parts, creation and designing of mechanical part and elements in 2D and 3D dimension, construction of mechanical parts in 3D dimension by means of CAD system.</li> <li>• <b>CAM Systems:</b> Principles of CAM systems, post-processor operation and typical examples. Introduction to different CAD/CAM neutral files, Importing and exporting CAD/CAM electronic neutral files (IGES, STEM, DXF, ....).</li> <li>• <b>NC code generation by CAD/CAM:</b> Production processes using CAD/CAM systems and CNC machine tools, NC Code in the material removal (milling, turning, wiring).</li> <li>• <b>Manual programming of a CNC machine tool:</b> Operation and programming of a CNC machine tool using advanced programming capabilities: canned cycles, coordinate transformations, subprograms and parameters.</li> <li>• <b>CAD/CAM programming of a CNC machine tool:</b> Operation and programming of CNC machine tool using CAM systems. Machining of automotive parts with complex geometry such as dies with sculptured surfaces, pockets with intricate form and internal islands, etc.</li> <li>• <b>Laboratory work:</b> A series of machining applications on a 5-axis CNC</li> </ul>		

	machining center and a CNC turning machine.
Recommended and/or required reading:	
Textbooks:	Mikell P. Groover, "Automation, Production Systems, and Computer-Integrated Manufacturing", Prentice Hall, 2014.
References:	Peter Smid, CNC Programming Techniques, Industrial Press, 2006
Planned learning activities and teaching methods:	<ul style="list-style-type: none"> <li>• Lectures for learning the methodology of manufacturing based on CAD/CAM Systems. Lecture notes and presentations are available through the web for students to use in combination with the textbooks.</li> <li>• Computer-assisted simulation examples of representative automotive parts.</li> <li>• Laboratory experiments: Actual machining on modern CNC machines. (Carried out in small groups.)</li> </ul>
Assessment methods and criteria:	<ul style="list-style-type: none"> <li>• Test: 15%</li> <li>• Lab: 30%</li> <li>• Mini-project: 15%</li> <li>• Final Exam 40%</li> </ul>
Language of instruction:	English
Work placement(s):	No