Course Title	Industrial applications of modern CAD/CAM Systems				
Course Code	MED503				
Course Type	Compulsory				
Level	Masters (2nd Level)				
Year / Semester	1st year / Spring Semester				
Teacher's Name	Dr. Sotiris Omirou				
ECTS	10	Lectures / week	2	Laboratories/week	1
Course Purpose	The course purpose is for the students be able to use CAD/CAM software for the manufacturing of parts or components in industrial scale. Students will gain the ability to prepare complex 3D parts for manufacturing be means of CNC machines. By the end of this course students should be able to use engineering				
Learning Outcomes	By the end of the course, students must be able to: 1. Acquire greater breadth and depth technical knowledge in the areas of CAD/CAM. 2. Describe the technology of a CNC system in both software and hardware terms 3. Use effectively a modern CAD system for designing mechanical parts and elements in 2D and 3D dimensions. 4. Compare and contrast the operation and programming of a CNC machine tool using manual programming and a CAD/CAM system. 5. Develop advanced and flexible programs using sub-programming and parametric techniques. 6. Maximize the ability to switch between different post processors in a CAM software and edit posted programs with a CAM software.				
Prerequisites	None			Corequisites	None
Course Content	1. Computer Aided Design Commercial CAD packages, CAD definition, CAD activities, benefits of CAD, Role of interactive computer graphics in modern design and manufacturing. Geometric modelling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired. Drafting and Modeling systems, basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling. Graphics standards. 2. Computer Aided Manufacturing Introduction, CAM definition, functions of CAM, benefits of CAM. Integrated CAD/CAM organization. Generation of CNC codes from CAD models, post processors. Application of all stages on modern				

	CAD/CAM systems to design and machine various mechanical parts with gradually increased complexity including dies with sculptured surfaces, pockets with intricate form and internal islands, etc. 3. CNC Technology and Programming CNC controls, Definition of Numerical Control, advantages of CNC machines, types of CNC Machine Tools, components of NC systems: Spindle drives, DC motors, stepping motors, servo motors, slide ways, recirculation ball screw, tool magazine, feedback devices: encoders, linear and rotary transducers. open and closed loop systems, machine zero, work zero, tool zero and tool offsets, motions, tool information, spindle speeds and feedrates. 4. Generation of NC programs through Programming Preparatory functions and G codes, miscellaneous functions and M codes, sample programs for lathe and milling. Advanced programs with canned cycles: peck drilling, thread, slot and pocket cutting, circular and rectangular array of holes. Modern developments: Subprograms and program section repeats, Parametric programming, Macros. 5. Laboratory work A series of machining applications on a 3-axis CNC machining center and a CNC turning machine using state of the art CAD/CAM systems.
Teaching Methodology	Teaching methods are based on problem-based learning, cases-based learning and the use of eLearning platform and online sources. All these approaches are related to a more active student-centred education. In combination with the previous, 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. Computer-assisted simulation examples of representative mechanical parts. Laboratory work: Actual machining on modern CNC machines.
Bibliography	**Textbook** 1. Mikell P. Groover: Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice Hall. **References** 1. Hans Bernhard Kief, Helmut A. Roschiwal, Karsten Schwarz, The CNC Handbook: Digital Manufacturing and Automation from CNC to Industry 4.0, Industrial Press, 2021 2. Gaurav Verma, Matt Weber, SolidWorks CAM 2022, , Cadcamcae Works, 2021 3. P. N. Rao, CAD/CAM Principles and Applications, 2002, Tata Mc Graw Hill Publishing Company Ltd. 4. W. Howard, J. Musto, Introduction to Solid Modeling Using SOLIDWORKS 2020, McGraw Hill, 16th Edition, 2020 5. Ibrahim Zeid, Mastering CAD/CAM, 2007, Tata McGraw-Hill Publishing Company Ltd. 6. Robert Quasada, Computer Numerical Control - Machining and Turning center, Prentice Hall, 2005.
Assessment	1. Assignments 40% 2. Final Exam 60%

Language	English