

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

Course Title	CNC Technology and Programming	Course Code	MEXXXX			
Dept./ Specialization	Mechanical Engineering	Structure (LTPC)	3	1	0	4
To be offered for	UG/PG	Status	Core	Elective	<input type="checkbox"/>	
Faculty Proposing the course	Dr. Senthilkumaran K	Type	New	Modification	<input type="checkbox"/>	
Recommendation from the	DAC: Yes	Date of DAC	01-06-2021			
External Expert(s)	Professor PVM Rao, Department of Mechanical Engineering, IIT Delhi.					
Pre-requisite	Manufacturing Processes-II	Submitted for approval	46 th Senate			
Learning Objectives	<p>The objectives of this course are to train the students.</p> <ul style="list-style-type: none"> To understand the principles, techniques, and applications of computer numerically controlled machine tools. To write manual G and M code programming of industrial machines, tooling systems. To introduce Computer Aided Manufacturing (CAM) systems and postprocessing for modern controllers. 					
Learning Outcomes	<p>At the end of the course, students would be able to</p> <ul style="list-style-type: none"> explain the basic types of CNC machine tools and the manufacturing operations for which they are best suited. prepare G and M code programs and documentation for the manufacturing steps required to produce machined parts on CNC turning and machining centres. develop part programs for machining free form surfaces 					
Contents of the course (With approximate break-up of hours for L/T/P)	<p>Basics and need of CNC machines, NC, CNC and DNC systems, Structure, Applications and Advantages of NC machines, CNC Routers. (5L+1T) Machine structure and configurations (parallel and serial), Guide ways, Motion transmission elements, Motors (5L+1T) Swarf removal and safety considerations, Automatic tool changers and multiple pallet systems (2L) Sensors and feedback devices, on-machine verification, and other accessories MTConnect, Industrial Internet of CNC Machines, DIY Hardware (5L+1T) Axis identification and coordinate systems, Structure of CNC part program, Programming codes, Programming for 2 and 3 axis control systems (5L+1T) Manual part programming for a turning center, Programming using tool nose radius compensation, Tools offsets, Do loops, sub routines and fixed cycles. (5L+2T) Wire-EDM programming, Programming special purpose machine tools (2L+1T) CAD/CAM based part programming. (5L+1T) Programming 5 axis machines for Free form machining, Tool path Verification, Tool path optimization (5L+1T) STEP-NC and other standards for CNC, DIY Software (3L) Tooling requirements of CNC machines, Pre-set and qualified tools, Work and tool holding devices in CNC machines. (2L)</p>					
Textbook	<ol style="list-style-type: none"> James V. Valentino and Joseph Goldenberg, Introduction to Computer Numerical Control, 5th edition, Prentice Hall, 2012, ISBN: 978-0132176033. Jon S. Stenerson and Kelly Curran, Computer Numerical Control: Operation and Programming, Prentice Hall, 2006, ISBN: 978-0131115477. 					
Reference Books	<ol style="list-style-type: none"> Peter Smid, CNC Programming Handbook, 3rd edition, Industrial Press, Inc, 2007. ISBN: 978-0831133474. Peter Smid, CNC Control Setup for Milling and Turning, 1 st edition, Industrial Press, Inc, 2010. ISBN: 978-0831133504. Yusuf Altintas, Manufacturing Automation Metal Cutting Mechanics, Machine Tool Vibrations, and CNC Design, 2nd edition, Cambridge University Press, 2012. ISBN: 9780521172479. Alan Overby, CNC Machining Handbook: Building, Programming, and Implementation, 1 st edition, McGraw-Hill Education, 2010. ISBN: 978-0071623018 					