



**National Institute of Technology Meghalaya**  
An Institute of National Importance

**CURRICULUM**

Programme	<b>Bachelor of Technology in Mechanical Engineering</b>	Year of Regulation	<b>2018</b>
Department	<b>Mechanical Engineering</b>	Semester	<b>VI</b>

Course Code	Course Name	Credit Structure				Marks Distribution				
		L	T	P	C	INT	MID	END	Total	
<b>ME 320</b>	<b>CAD-CAM</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>200</b>	
Course Objectives	To introduce the basic structure of CAD workstation and computer graphics	Course Outcomes	CO1	Interpret basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics .(Understanding)						
	To Explain the techniques of geometric modelling to represent parametric curves.		CO2	Explain the techniques of geometric modelling to represent parametric curves. (Understanding)						
	To develop an ability to use CAD software for developing 2D and 3D models and perform transformations		CO3	Apply the knowledge of geometric modelling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations. (Application)						
	To develop an ability and skill to use computer Aided Part Programming to machine the parts with different geometrical dimensions using CNC machines		CO4	Apply the knowledge of computer Aided Part Programming to machine the parts with different geometrical dimensions using CNC machines. (Application)						
	To Justify Group Technology, CAQC and CIM concepts		CO5	Analyse fundamental and advanced features of CNC machines.(Analysis)						
			CO6	Justify Group Technology, CAQC and CIM concepts.(Evaluation)						

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	1	2	2	0	0	0	0	0	0	0	0	3	1	0
2	CO2	3	3	3	3	3	0	0	0	0	0	0	0	3	2	0
3	CO3	3	3	3	3	3	3	0	0	1	1	0	0	3	3	0
4	CO4	3	3	3	3	3	3	3	2	2	2	2	2	3	3	0
5	CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
6	CO6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0

**SYLLABUS**

No.	Content	Hours	COs
I	<b>Introduction &amp; Elements of Interactive Computer Graphics</b> The design process, the role of modelling & communication, modelling using CAD, Product life cycle & CAD/ CAM, Concurrent engineering in product design & development, Collaborative Engineering, computers for design Process, CAD system architecture. Operator input and output devices, 2-D and 3-D computer graphics, vector generation, windowing and viewing transformation, Homogeneous coordinates, Perspective projection, Visual realism.	<b>09</b>	<b>CO1 CO2</b>
II	<b>Techniques for Geometric Modelling</b> Graphic standards, parametric representation of geometry, Bezier curves, Cubic Spline curve, B-Spline curve, parametric representation of line, circle, ellipse & parabola constructive solid geometry (CSG), Boundary representation, wire frame, solid, surface and parametric modelling.	<b>11</b>	<b>CO1 CO2 CO3</b>
III	<b>Transformation, Manipulation &amp; Data Storage</b> 2D & 3D Transformations (Translation, Rotation, and Scaling & Magnification), Concatenations, Matrix representation, Problems & object oriented programming on Transformations. Object transformation, mirror transformation, Data Structures for interactive modelling, Bill of materials from attribute data, artificial intelligence in design & manufacturing, representation of knowledge and knowledge base engineering.	<b>14</b>	<b>CO1 CO2 CO3</b>
IV	<b>NC &amp; CNC Technology</b> Basic components of NC systems, NC Procedure, coordinate systems, motion control systems, Punched tape in NC, Tape coding & format, Manual Part Programming, Computer Aided Part Programming, DNC, adaptive Control, CNC programming concepts, functions of a post processor; Feedback devices, Flexible Manufacturing Systems (FMS), Machining Centres and its types, Automated Material Handling & storage Systems like AGVs and ASRS etc.	<b>10</b>	<b>CO2 CO3 CO4 CO5</b>
V	<b>Group Technology, CAPP, and CAQC</b> Introduction to GT, Part Families, Part Classification & Coding, GT Machine cells, Benefits of GT, Computer Aided Process Planning (CAPP), Process Planning Systems, Benefits of CAPP, Artificial Intelligence in CAPP, Computer Aided Quality Control (CAQC), Computers in QC, Contact Inspection methods, Non-contact Inspection methods, Computer Aided Testing, Integration of CAQC with CAD/CAM.	<b>11</b>	<b>CO4 CO5 CO6</b>
VI	<b>Computer Integrated Manufacturing &amp; Technology Driven Practices</b> Introduction, CIM Hardware and Software, CIM Benefits, Nature and role of the elements of CIM, Identifying CIM needs, Data base requirements of CIM, Role of CAD/CAM in CIM, Obstacles to Computer Integrated Manufacturing, Concept of the future CIM systems, Socio -techno- economic aspects of CIM. Rapid and Virtual Prototyping, Design for Manufacturing, Reverse Engineering and Green Manufacturing.	<b>05</b>	<b>CO2 CO4 CO5 CO6</b>
<b>Total Hours</b>		<b>60</b>	

**Essential Readings**

1. M. P. Groover and Emory W. Zimmers, Jr., "CAD/CAM Computer Aided and Manufacturing", 22<sup>nd</sup> impression,2018
2. P. Radhakrishnan, S. Subramanyan, V. Raju, "CAD/CAM/CIM", New Age International Publishers,3<sup>rd</sup> edition,2008

**Supplementary Readings**

1. P.N. Rao, "CAD/CAM Principles and Applications", Tata McGraw Hill Publications,3<sup>rd</sup> edition,2012
2. D. L. Goetsch, "Fundamental of CIM technology", Delmar publication,1988
3. B.S. Pabla and M. Adithan, "CNC Machines", New Age International Publishers.,1<sup>st</sup> edition,1994,reprint 2005