

EM433 Computer-Aided Manufacturing

**United States Naval Academy
Mechanical Engineering Department**

Catalog Description: EM433 Computer-Aided Manufacturing

Credit: 3 (2-2-3)

Designation: Elective, engineering major

This course examines how computers and automation are used in modern manufacturing processes. Topics include machining processes, CNC programming, process planning, dimensioning, and tolerancing. Students participate in a manufacturing project which utilizes CAD/CAM software to design and manufacture a component using CNC machining equipment.

Prerequisites: 1/C engineering major

Textbooks: Groover, M.P., *Fundamentals of Modern Manufacturing*, Prentice-Hall, 2001
Required

Course Director: Prof. R.E. Link

Course Content:

No.	Topic or Subtopic	hrs.
1.	Engineering Drawings	3
2.	Dimensioning and Tolerancing, Geometric Tolerancing	6
3.	Metal Cutting	2
4.	Machine Tools and Machining	4
5.	CNC Machining	6
6.	Cutting Tools	1
7.	Production Lines & Automation	1
8.	Group Technology	1
9.	Process Planning	1
10.	Production Planning & Control	1
11.	Quality Control	1
12.	Manufacturing Project	20

Assessment Methods:

		YES	NO
A	Quizzes	X	
B	Homework	X	
C	Exams	X	
D	Laboratory Reports		X
E	Oral Presentations	X	
F	Design Reports/Notebooks	X	
G	Prototypes/Demonstrations	X	
H	Projects	X	
I	Other		X

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Course Outcomes¹:

1. Students will demonstrate an understanding of how computers are used for various aspects of the manufacturing enterprise (A,B,C,H)
2. Students will demonstrate an understanding of typical metal removal processes (A,B,C)
3. Students will select and specify processes and parameters for machining simple metallic parts (F,G,H).
4. Students will demonstrate the ability to specify tolerances and finish requirements for proper functioning of parts in an assembly (A,B,C,G,H)
5. Students will participate in site visits to actual manufacturing operations to witness mass production and assembly operations (A,B)
6. Students will visit manufacturing plants to discuss the various roles a manufacturing engineer plays in a typical manufacturing plant (A,B)
7. Students will demonstrate the ability to develop detailed manufacturing process plans, including the necessary CNC programs for the machine tools, to produce a series of related parts for an assembly (B,F,G,H).
8. Students will witness their process plans being employed in a machine shop environment to produce actual prototypes of their parts (G,H).

¹ Letters in parenthesis refer to the assessment methods listed in the previous section.

	Course Outcomes									
Program Outcomes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
(a)		X	X	X	X	X				
(b)										
(c)			X	X			X	X		
(d)						X				
(e)	X						X			
(f)						X				
(g)							X			
(h)										
(i)										
(j)					X	X				
(k)	X							X		

Date of Latest Revision: 29 APR 2010, Prof. R.E. Link