United States Naval Academy
Mechanical Engineering Department

Catalog Description: EM232 Dynamics **Credit:** 3 (3-0-3)
Designation: Required, engineering

Course in classical vector dynamics. Topics include vector algebra and calculus, kinematics and kinetics of particles and rigid bodies, as well as energy and momentum methods. Extensive problem solving involving particle and rigid body motion is required.

Prerequisites: EM211 Statics
Corequisites: SM212 Differential Equations
Textbook: *Engineering Mechanics: Dynamics"* by R. C. Hibbeler, 14th Edition, Prentice Hall.

Course Director: Assoc. Prof. Joshua J. Radice

Course Content:

No.	Topic or Subtopic	hrs.
1	Introduction	1
2	Particle kinematics and coordinate systems	6
3	Particle relative motion	3
4	Equations of motion for particles	3
5	Work energy methods for particles	2
6	Impulse momentum for particles	4
7	Kinematics of rigid bodies	5
8	Rigid body equations of motion	5
9	Work energy methods for rigid bodies	3
10	Impulse momentum methods for rigid bodies	3

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

Course Outcomes[1]

1. Select a suitable coordinate system and reference coordinate axes and describe the two-dimensional motion of a particle in those coordinate systems. (A, B, C)

2. Select a suitable solution method or combination of methods for problems involving particle or rigid body motion. (A, B, C)

3. Construct free body force diagrams and kinetic diagrams for particle or rigid body motion, understand the relationship between them and use them to formulate equations of motion. (A, B, C)

4. Construct impulse and momentum diagrams for particle or rigid body motion, understand the relationship between them and use them to formulate equations of motion. (A, B, C)

5. Formulate work-energy relationships and use them to solve problems involving particles and rigid bodies. (A, B, C)

6. Apply Coulomb dry friction to particle and rigid body engineering problems. (A, B, C)

7. Communicate engineering solutions effectively and clearly (A, B, C)

[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)
(a)	X	X	X	X	X	X	X
(b)							
(c)			X				X
(d)							
(e)	X	X	X	X	X	X	X
(f)							
(g)							X
(h)							
(i)							
(j)							
(k)	X	X	X	X	X	X	X

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