

EM471 Mechanical Engineering Design I

**United States Naval Academy  
Mechanical Engineering Department**

**Catalog Description:** EM471 Mechanical Engineering Design I

**Credit:** 3 (2-2-3)

**Designation:** Required, engineering design, capstone course (part 1)

The first course in a two-semester capstone design sequence. Topics include the engineering design process, project management, codes and standards, engineering ethics, and computer-aided design. Students form design teams, select a capstone design project and progress through the proposal and preliminary design stages of the project. The capstone design project continues in EM472.

**Prerequisites:** EM371 Introduction to Design

**Corequisites:** None

**Textbooks:** Course Handouts

**Course Director:** Prof. R.E. Link

**Course Content:**

No.	Topic or Subtopic	hrs.
1	Engineering Design Process	16
2	Modeling and evaluation of engineering alternatives	8
3	Project Management	4
4	Engineering ethics	2
5	Engineering Codes and Standards	2
6	Finite Element Analysis, Mechanism Design	12
7	Rapid Prototyping, manufacturing	5
8	Capstone Design	12

**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<sup>1</sup>:**

1. Select a Capstone Design Project, develop a proposal for the project and present the

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- proposal (E,F)
2. Employ the engineering design process to develop candidate solutions to meet the objectives of the capstone design project. Document the candidate solutions in a Preliminary Design Report (A,B,F)
  3. Use project management tools to plan the design process and track progress of the project (A,B,F,H)
  4. Use computer-aided design techniques such as solid modeling, assembly modeling, rapid prototyping and finite element analysis to document and analyze design details.(F,H)
  5. Apply principles of professional engineering ethics to case studies. Understand the role of engineering codes and standards in the design process. (A,B,E)

<sup>1</sup> Letters in parenthesis refer to the assessment methods listed in the previous section.

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

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