

EM215 Introduction to Mechanical Engineering

**United States Naval Academy
Mechanical Engineering Department**

Catalog Description: EM215 Introduction to Mechanical Engineering **Credit:** 3 (1-4-3)

Designation: Required, engineering sciences and design

This is an overview course for Mechanical Engineering majors only that introduces the student to the main areas of mechanical engineering: mechanics, materials, and thermo-science. In addition, it provides background in visualization skills and the design process. Projects are used to enhance the understanding of mechanical engineering and the design process.

Prerequisites: None. For Mechanical Engineering Majors only

Co-requisites: None.

- Textbooks:**
- (1) *Fundamentals of Engineering Supplied-Reference Handbook*, NCEES, latest edition.
ISBN 1-93-261330-7 (for 2007 Ed).
 - (2) *MATLAB for Engineers*, by Holly Moore, Pearson Prentice Hall, 2007.
ISBN 0-13-187244-3.
 - (3) *Engineering Reasoning*, by Richard Paul, Robert Niewoehner, and Linda Elder, Foundation for Critical Thinking, 2006.
ISBN 0-944583-33-4.

Course Director: CDR Matthew Carr, USN

Course Content:

No.	Topic or Subtopic	hrs
1	Orientation to Mechanical Engineering	2
2	Engineering Drawing – Hand Sketching and SolidWorks	8
3	Intro to Thermal Fluids w/ Lab	5
4	Intro to Mechanics w/ Lab	5
5	Intro to Material Science w/ Lab	5
6	MATLAB	15
7	Design Process Overview and Exercise	5
8	Research Skills; Critical Thinking; Engineering Ethics	5
9	Professional Writing; Documenting Formal Calculations	5
10	Course Design-Build Project	20
	Total →	75

Assessment Methods:

	Method	YES	NO
A	Quizzes		X
B	Homework	X	
C	Exams	X	
D	Laboratory Reports	X	
E	Oral Presentations	X	
F	Design Reports/Notebooks	X	

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	Method	YES	NO
G	Prototypes/Demonstrations	X	
H	Projects	X	
I	Other		X

Course Outcomes¹

At the conclusion of this course, the student should be able to:

- Outcome 1: Explain the sequence of courses for the Mechanical Engineering Major as listed in the Mechanical Engineering matrix and associate each of the courses with one (or more) of the main sub-disciplines of Mechanical Engineering, including 1) Mechanics and Materials, 2) Thermal-Fluid Sciences and/or 3) Engineering Design. (Assessment Method C)
- Outcome 2: Create, dimension and interpret orthographic, isometric, and section-type engineering drawings. (Assessment Method B, C, F, G)
- Outcome 3: Use academic search engines and databases, beyond those available to the general public, to locate articles, reference material, and other sources of engineering information. (Assessment Method B, F, H)
- Outcome 4: Write a laboratory report in proper memorandum format, both individually and in a team environment. (Assessment Method D)
- Outcome 5: Demonstrate critical thinking skills using the model and vocabulary of the *Engineering Reasoning* booklet in evaluating experimental results and engineering articles. (Assessment Method B, C, D)
- Outcome 6: Demonstrate basic proficiency in the MATLAB software package. (Assessment Method B, C, D)
- Outcome 7: Demonstrate basic proficiency in the SolidWorks software package. (Assessment Method B, C, D, E, F)
- Outcome 8: Execute a formal design calculation involving selecting appropriate theory and associated equation(s), manipulation of equations to solve for the appropriate parameter and unit analysis to solve for a design parameter. (Assessment Method B, D, F)
- Outcome 9: Formulate and execute a project plan as part of an overall design project involving task delineation, task sequencing, and schedule management. (Assessment Method F, G, H)
- Outcome 10: Demonstrate a basic appreciation for the ethics expected of the engineering profession and consideration of the potential negative consequences when ethical implications are not adequately considered. (Assessment Method B, C, H)

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

Program Outcomes	Course Outcomes									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(a)		X		X	X	X	X	X	X	X
(b)								X	X	
(c)		X			X	X	X	X		
(d)				X	X				X	

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Program Outcomes	Course Outcomes									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(e)			X	X	X	X	X	X	X	
(f)					X					X
(g)		X		X	X			X	X	
(h)			X		X					X
(i)										
(j)			X							X
(k)		X	X	X	X	X	X	X	X	

Date of Latest Revision: 11 JUN 2010, CDR Matthew Carr, USN