

**UNIVERSITY OF KENTUCKY**  
**DEPARTMENT OF MECHANICAL ENGINEERING**

**EM 221**  
**STATICS (Required)**

Catalog Data 2003-04: EM221: STATICS. (3) Study of forces on bodies at rest. Vector algebra; study of force systems; equivalent force systems; distributed forces; internal forces; principles of equilibrium; application to trusses, frames and beams; friction. Prereq or concur: MA213

Prerequisites: MA213 CALCULUS III (or concur)

Textbook: *Engineering Mechanics, Statics*, 5<sup>th</sup> Edition, by J. L. Meriam and L. G. Kraige, Wiley, 2002.

Goal: This course emphasizes vector concepts/operations, moment-taking techniques, free-body diagrams, and equilibrium. Application to structures such as trusses, beams, and frames will reinforce the fundamental concepts and skills. Finding centroid and moment of inertia will refresh students' skills in calculus and lay ground for subsequent courses such as Solids and Dynamics. Introduction to dry friction is also essential to many subsequent courses.

Outcomes:

Students will be able to:

1. Find moment of a force in both 2D and 3D.
2. Find resultants of force-couple systems and distributed loading systems.
3. Draw the free-body diagram.
4. Solve equilibrium problems in both 2D and 3D.
5. Analyze trusses, frames, and simple machines.
6. Draw shear and bending moment diagrams for different kinds of beams.
7. Solve problems involving dry friction.
8. Find the centroid for a line, area, volume or mass.
9. Find moments of inertia for areas.

Topics Covered: Vector algebra; forces and moments; couples; equivalent force-couple systems; 3D moments about a point and about an axis; free-body diagrams; 2D and 3D equilibrium; trusses; frames and machines; centroid of lines, areas and volumes; distributed forces; fluid statics; shear and bending moment diagrams for beams; friction; area moment of inertia.

Class Schedule: Three 50 minute lecture sessions per week

Contribution of Course to Professional Component: This course provides the student with the basic concepts and application of statics.

Engineering Science: 100%  
 Engineering Design: 0%  
 Other: 0%

Relation of Course to Program Outcomes:

	EM 221	EM 221
	Statics	Statics
	Lecture	Homework
<b>CR</b>		
<b>HR</b>	3	3
<b>Total Hr</b>	45	100
<b>Engr Topics</b>	<b>A</b>	50
<b>Experimentation</b>	<b>B</b>	
<b>Design</b>	<b>C</b>	
<b>Teamwork</b>	<b>D</b>	
<b>Engineering problems</b>	<b>E</b>	45
<b>Prof &amp; Ethics</b>	<b>F</b>	
<b>Communication</b>	<b>G</b>	2
<b>Broad Education</b>	<b>H</b>	
<b>Life-Long Learning</b>	<b>I</b>	
<b>Contemporary Issues</b>	<b>J</b>	
<b>Technical Skills</b>	<b>K</b>	3

Prepared by: T. W. Wu, May 28, 2004