

**King Mongkut's University of Technology Thonburi**  
**Faculty of Engineering**  
**Department of Mechanical Engineering**

*Course Syllabus (Semester 1/2011)*

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<i>Lecture Course:</i>	MEE211: Engineering Mechanics 1 (Statics)
<i>Year/Term:</i>	Second year, First semester
<i>Lecturer(s):</i>	Ekachai Klaiwongwal Chawin Chantharasenawong ( <a href="mailto:chawin.cha@kmutt.ac.th">chawin.cha@kmutt.ac.th</a> ) Pattaramon Jongpradist ( <a href="mailto:pattaramon.tan@kmutt.ac.th">pattaramon.tan@kmutt.ac.th</a> )
<i>Duration:</i>	42 hours of lectures (14 sessions of three-hour lectures)
<i>Prerequisite:</i>	PHY111
<i>Tutorial Hours:</i>	Arranged by appointments through email

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***Objectives***

Upon completion of the course, students are expected to

1. be able to perform a thorough force analysis of rigid bodies and simple structures in equilibrium condition
2. be able to determine the centres of gravity and moments of inertia of simple geometric shapes and understand the physical applications of these properties
3. understand the use and be able to perform calculations related to friction forces in various engineering applications
4. understand the concept of virtual work and utilise it correctly

***Syllabus***

*Three-dimensional force systems:* Resultant force, Equilibrium of rigid bodies, Moments of force and couples, Vector manipulation in a three-dimensional space

*Structural analysis:* Pin jointed framework analysis, Static determinacy, Method of sections

*Distributed forces:* Centres of mass of two-dimensional geometric shapes, Second moments of area of two-dimensional geometric shapes and composite bodies, Parallel axis theorem, Radius of gyration, Perpendicular axis theorem, Products of inertia, Rotation of axis, Principal axes, Mohr circle of inertia

*Friction:* Friction phenomena, Mechanism of dry friction, Friction angles, Engineering applications of friction, Wedges, Screws, Journal bearings, Disk friction, Flexible belts

*Virtual work:* Principle of virtual work and virtual displacement. Potential energy and stability.

### **Course breakdown by lectures**

<i>Topic No.</i>	<i>Description</i>	<i>Week(s)</i>
1	<i>Introduction</i> Description of course objectives and outlines. Differences between static and dynamic engineering mechanics. Basic terminologies. Free body diagram.	1
2	<i>Three-dimensional force systems</i> Resultant force. Equilibrium of rigid bodies. Moments of force and couples. Vector manipulation in a three-dimensional space.	2
3	<i>Structures</i> Pin jointed framework analysis. Static determinacy.	3
4	<i>Method of sections</i>	4
5	<i>Distributed forces 1</i> Centres of mass of two-dimensional geometric shapes.	5
6	<i>Distributed forces 2</i> Second moments of area of two-dimensional geometric shapes and composite bodies. Parallel axis theorem. Radius of gyration. Perpendicular axis theorem.	6
7	<i>Distributed forces 3</i> Products of inertia. Rotation of axis. Principal axes. Mohr circle of inertia.	7-8
8	<i>Friction 1</i> Friction phenomena. Mechanism of dry friction. Friction angles.	9
9	<i>Friction 2</i> Wedges. Screws. Journal bearings. Disk friction. Flexible belts.	10-11
10	<i>Virtual work</i> Principle of virtual work and virtual displacement. Potential energy and stability.	12-13

### **Assessment**

The course is assessed by classroom quizzes, tutorials (homework), a class project, closed book mid-term and final examinations. The total grade is determined using the following weighting scheme.

1.	Tutorials (homework/quiz)	10%	
2.	First examination	Thu. 30/06/11	20%
3.	Midterm examination	Thu. 21/07/11	20%
4.	Final examination	Wed. 28/09/11	40%
5.	Class project	Thu. 08/09/11 (tentative)	10%

- Each student is allowed to bring one non-graphical scientific calculator into examinations
- Students whose total marks are below 35% at the end of the semester will receive an *F*-grade and will be required to retake the subject
- Students must be present in all examinations otherwise they will receive an *Fe*-grade. Only extenuating circumstances will be accepted as an excuse for missing an exam. Health related excuses require medical reports and the signature of a physician that provided treatment.

***Recommended textbooks***

1.     *Title:*             Engineering Mechanics – Statics, 6<sup>th</sup> Edition (SI unit)  
           *Author:*         J. L. Meriam and L. G. Kraige  
           *Publisher:*     John Wiley & Sons  
           *Relevance:*    A
  
2.     *Title:*             Engineering Mechanics – Statics, 11<sup>th</sup> Edition (SI unit)  
           *Author:*         R. C. Hibbeler  
           *Publisher:*     Prentice Hall  
           *Relevance:*    A
  
3.     *Title:*             Statics – Analysis and Design of Systems in Equilibrium  
           *Author:*         S. D. Sheppard and B. H. Tongue  
           *Publisher:*     John Wiley & Sons  
           *Relevance:*    B