



**The Twinning Engineering Programmes**  
**Thammasat English Programme of Engineering**  
Civil Engineering Program  
Thammasat University

**CE 202 Engineering Mechanics – Statics**

**Semester 1/2016**

**Section:750001** (Mon 13:30-16:30) EE+CE+ME, Room ENG-308

Instructors: Asst.Prof.Dr. Chaisak Pisitpaibool (ชัยศักดิ์ พิสิษฐไพฑูริย์) Office: ENG-414/2

**Section:750002** (Mon 16:30-19:30) AE, Room ENG-319

Instructors: Ajarn.Dr. Krisada Chaiyasarn (กฤษณา ไชยสาร) Office:ENG-420/4

**Section:750003** (Fri 8:00-11:00) IE, Room ENG-322

Instructor: Asst.Prof.Dr Witawats Satasook (วิทวัส สดสุข) Office:ENG-425/3

**Prerequisite:** SC 133 PHYSICS FOR ENGINEERING

**Objectives:** Students are expected to:

1. understand the key concepts, laws, and basic principles of statics.
2. progress in a mechanics course only by understanding the physical and mathematical principles jointly, not by mere memorization of formulas.
3. have abilities to apply theory of mechanics to analyze and solve practical engineering problem in a logical manner.

**Course Description:**

Force system. Forces in plane and space. Resultants and equilibrium of particles and rigid bodies. Center of gravity. Moment of inertia. Trusses, frames and machines. Beams. Friction. Principle of virtual work.

**Text:** Hibbeler, R.C., **Engineering Mechanics – Statics**. Edition in SI Units Pearson Prentice Hall, Singapore.

**References:** Any books related to **Engineering Mechanics – Statics**

**Teaching Schedule:**

Course Topics

**CHAPTER 1 GENERAL PRINCIPLES**

Mechanics, Fundamental Concept, **Newton's Three Laws of Motion**. Units of Measurement, The International System of Units, Numerical Calculations, General Procedure for Analysis

**CHAPTER 2 FORCE VECTORS**

Scalar and Vectors, Vector operations, Vector Additional of Forces, Additional of a System of Coplanar Forces, Cartesian Vectors, Position Vectors, Force Vector Directed Along a Line, Dot Product

**CHAPTER 3 EQUILIBRIUM OF A PARTICLE**

Condition for the Equilibrium of a Particle, The Free-Body Diagram (FBD), Coplanar Force Systems (two dimensions), Three-dimensional Force Systems

## **CHAPTER 4 FORCE SYSTEM RESULTANTS**

Moment of a force-Scalar Formulation, Cross Product, Moment of a Force-Vector Formulation, Principle of Moment, Moment of a Force about a Specified Axis, Moment of a couple (torque), Simplification of a Force and Couple System, Further Simplification of a Force and Couple System, Reduction of a Simple Distributed Loading

## **CHAPTER 5 EQUILIBRIUM OF RIGID BODY**

Conditions for Rigid-Body Equilibrium, Equilibrium in Two-dimensions, Equations of Equilibrium, Two- and Three-Force Members, Free-Body Diagrams, Equilibrium in Three Dimension, Free-Body Diagrams, Equilibrium of Equilibrium, Constraints and Statically Determinacy

## **CHAPTER 9 CENTRE OF GRAVITY AND CENTROID**

Center of gravity, Center Mass and the Centroid of a Body, Composite Bodies, **Theorems of Pappus and Guldinus**. Resultant of a General Distributed Loading. **Fluid Pressure**

## **CHAPTER 10 MOMENTS OF INERTIA**

Definition of Moment of Inertia for Areas, Parallel-Axis Theorem for an Area, Radius of Gyration of an Area, Moment of Inertia for Composite Areas

## **CHAPTER 6 STRUCTURAL ANALYSIS**

Simple Trusses, Method of joints, Zero-Force Members, The method of Sections, Frames and Machines

## **CHAPTER 7 INTERNAL FORCES (IN STRUCTURAL MEMBERS)**

Internal Forces Developed in Structural Members, Shear and Moment Equations and Diagrams, Relation Between Distributed Load, Shear and bending Moment

## **CHAPTER 8 FRICTION**

Characteristic of Dry Friction, Problems involving Dry Frictions

## **CHAPTER 11 METHOD OF VIRTUAL WORK**

Definition of Work, Principle of Virtual Work, Principle of Virtual Work for Connected Rigid Bodies. **Potential Energy. Stability of Equilibrium Configuration. Kinetics of Rigid Bodies. Work and Energy. Impulse and Momentum.**

Notes:

**Mid-term Examination:** Chap 1-5, *Sun 2<sup>nd</sup> October 2016* (14.30-16.30. 2 hrs)

**Final Examination:** Chap 6-11, *Wed 7<sup>th</sup> December 2016* (13.00-16.00, 3 hrs)

## **METHODS OF ASSESSMENT:**

1.	Homework/Assignments	5%
2.	Quiz and Class attendance	5%
3.	Mid-term examination	35%
4.	Final Examination	55%