GEN ENG 205-2
Engineering Analysis 2: Statics and Dynamics
Winter 2007

Instructor:	José E. Andrade Office: Tech A124 Office Hours: T 12 – 1, Th 10 – 11, and by appointment Phone: (847) 491-5884 Email: `j-andrade@northwestern.edu`
Teaching Assistants:	Kirk Ellison & Izzat Katkhuda
Class Times and Locations:	MTWThF 11-11:50, Tech L361
Class Website:	Northwestern Course Management System `http://courses.northwestern.edu`

Required Textbook

Bedford, A. and Fowler, W. (2005); *Engineering Mechanics: Statics & Dynamics*, Fourth Edition; Prentice-Hall, Inc.; Upper Saddle River, New Jersey.

Course Objectives

- Introduction to basic concepts in **engineering mechanics**, including statics and dynamics of particles and rigid bodies, and linear elastic deformation;
- Understanding the process of engineering analysis in which fundamental concepts are employed through a logical step-by-step method of **problem solving**;
- Further understanding and application of **mathematical tools**: vectors, linear algebra, calculus, etc; and
- Extending the **programming skills** and concepts introduced in Engineering Analysis 1 to make MATLAB an everyday tool for solving engineering design and analysis problems.

Prerequisites

- Engineering Analysis 1 (**GEN ENG 205-1**)
- Calculus 1 (**MATH 214-1**)

Course Assessment

Grading is based on the following components that are weighted as described below:

1. Homework: 20%
2. Design Problem: 20%
3. Midterm Examinations (2): 15% each
4. Final Exam: 30%

Each of the components is described below. Grades will be posted periodically on the class website. Please check your grades to make sure your scores are recorded correctly.

Homework

- Homework will be assigned weekly and will be due on Fridays. The general policy is that homework is to be turned in during class on Friday. **Extensions to turn the homework in by 5 PM on Friday are granted in advance and under special circumstances.**
- There will be at least one problem assigned each week that will require you to use MATLAB.
- Solutions to the homework problems will be posted on the course website at 5 PM on Fridays. Therefore, no late homework can be accepted, except for those with extensions granted in advance (see first item above).
- Be professional, e.g., use engineering graph paper, write neatly, write on one side of page only, and show all work.

Please make sure to start early so that you can ask questions during class, recitations, or office hours.

Design Problem

The design problem will be assigned in week 5 and will be due on week 9. It will be an in-depth problem emphasizing creative thinking, integrating the material from the class, and requiring an organized written report. Detailed instructions will be included with the assignment.

Examinations

We will have 3 exams as detailed below. Additional information will be provided as we near the exam dates.

1. EXAM #1: Thursday, February 1 in class.
2. EXAM #2: Thursday, February 22 in class.
3. FINAL EXAM: Thursday, March 15 from 12-2 pm (Room TBA).

Special arrangements must be discussed with the instructor at least 2 weeks in advance of the exam dates. Travel plans ARE NOT sufficient to warrant special accommodations.

Comments, Suggestions, and Additional Information

1. There will be two TAs who will be assigned to our section. Their contact information and office hours will be posted on the class website on Wednesday, January 3.

2. Take advantage of office hours! This is time we have set aside to meet with students. In addition to our office hours, you will have access to office hours of the TAs for other EA2 sections. All office hours will be posted on the class website.

3. Announcements, hints for homework problems, homework solutions, grades, errata, etc. will be posted on the class website (frequently). Check the site once or twice per week.

4. The best way to reach us is via email. We can usually get back to students within 24 hours.

5. Questions about grading should be raised with the TA during his/her office hours. If a question is not answered to your satisfaction, then (and only then) you should raise it with the instructor (also during office hours).

6. Suggestions:

   - Spend time mastering the fundamental concepts introduced in the early part of the course.
   - Solve problems! Learning Mechanics is like learning to play a musical instrument. It is possible, albeit extremely unlikely, to learn to play by watching somebody else play. At a minimum, you should understand the homework problems, the examples presented in class, and the examples in the textbook.

GEN_ENG 205-2
ENGINEERING ANALYSIS 2
WINTER QUARTER 2007

Prof. José E. Andrade

Preliminary Course Outline

Week 1

Lecture 1	Wed, 1/3	Chapter 1: Fundamental Concepts
Lecture 2	Thu, 1/4	Chapter 2: Vectors §2.1, §2.2, §2.3 (Vector basics)
Lecture 3	Fri, 1/5	Chapter 2: Vectors §2.4, §2.5 Dot product

Week 2

Lecture 4	Mon, 1/8	Chapter 2: Vectors §2.6, §2.7, Chapter 3: Forces §3.1 (Basics)
Lecture 5	Tue, 1/9	Chapter 3: Forces §3.2, §3.3 2D force systems
Lecture 6	Wed, 1/10	Chapter 3: Forces §3.3 2D force systems (finish)
Recitation 1	*Thu, 1/11*	*Review of 2D force systems*
Lecture 7	Fri, 1/12	Chapter 3: Forces §3.4 3D force systems

Week 3

No class on Monday 1/15 (MLK day)

Lecture 8	Tues, 1/16	Chapter 3: Forces §3.4 3D force systems (finish)
Lecture 9	Wed, 1/17	Chapter 4: Moments §4.1, §4.2, §4.3 (Moment basics)
Recitation 2	*Thu, 1/18*	*Review three-dimensional force systems, moments*
Lecture 10	Fri, 1/19	Chapter 4: Moments §4.4 Couples

Week 4

Lecture 11	Mon, 1/22	Chapter 4: Moments §4.5, 4.6 Equivalent systems
Lecture 12	Tue, 1/23	Chapter 5: Objects in Equilibrium §5.1, §5.2 2D equilibrium
Recitation 3	*Wed, 1/24*	*Review equilibrium, Equivalent systems*
Lecture 13	Thu, 1/25	Chapter 5: Objects in Equilibrium §5.2 2D equilibrium
Lecture 14	Fri, 1/26	Chapter 5: Objects in Equilibrium §5.3 Static Indeterminacy

Week 5

Lecture 15	Mon, 1/29	Chapter Chapter 5: Objects in Equilibrium §5.4 3D Applications
Lecture 16	Tue, 1/30	Chapter 5: Objects in Equilibrium §5.5 Two and three force members
Lecture 17	Wed, 1/31	Chapter 6: Structures in Equilibrium
EXAM 1	**Thu, 2/1**	
Lecture 18	Fri, 2/2	Chapter 6: Structures in Equilibrium §6.1, 6.2 Trusses
		Design Project Assigned (Due March 2)

Week 6

Lecture 19	Mon, 2/5	Chapter 6: Structures in Equilibrium §6.3 Method of sections
Lecture 20	Tue, 2/6	Chapter 6: Structures in Equilibrium §6.3 Method of sections (finish)
Lecture 21	Wed, 2/7	Chapter 6: Structures in Equilibrium §6.5 Frames and Machines
Recitation 4	*Thu, 2/8*	*Review Trusses, Frames and Machines*
Lecture 22	Fri, 2/9	Chapter 6: Structures in Equilibrium §6.5 Frames and Machines

Week 7

Lecture 23	Mon, 2/12	Chapter 6: Structures in Equilibrium §6.5 Frames and Machines
Lecture 24	Tue, 2/13	Linear Elastic Deformation
Lecture 25	Wed, 2/14	Linear Elastic Deformation
Recitation 5	*Thu, 2/15*	*Review axial deformations*
Lecture 26	Fri, 2/16	Linear Elastic Deformation

Week 8

Lecture 27	Mon, 2/19	Linear Elastic Deformation
Lecture 28	Tue, 2/20	Chap. 13: Kinematics of Particles
Lecture 29	Wed, 2/21	Chap. 13: Kinematics of Particles
Exam 2	**Thu, 2/22**	
Lecture 30	Fri, 2/23	Chap. 13: Kinematics of Particles

Week 9

Lecture 31	Mon, 2/26	Chap. 13: Kinematics of Particles
Lecture 32	Mon, 2/27	Chap. 13: Kinematics of Particles
Lecture 33	Wed, 2/28	Chap. 13: Kinematics of Particles
Recitation 6	*Thu, 3/1*	*Kinematics, Normal and Tangential Components*
Lecture 34	Fri, 3/2	Chap. 14: Force Mass and Acceleration
		Design Project is Due in Class

Week 10

Lecture 35	Mon, 3/5	Chap. 14: Force, Mass and Acceleration
Lecture 36	Tue, 3/6	Chap. 14: Force, Mass and Acceleration
Lecture 37	Wed, 3/7	Chap. 14: Force, Mass and Acceleration
Recitation 7	*Thu, 3/8*	*Review*
Lecture 38	Fri, 3/9	Review

FINAL EXAM: Thursday, March 15 from 12-2 pm, room TBA