GEN_ENG 205-2
Engineering Analysis 2: Statics and Dynamics
Winter Quarter 2018

Instructor	Prof. James P. Hambleton Office: Tech A122 Office hours: Mon 3:00-4:00pm; Fri 3:00-4:00pm; by appointment Phone: (847)491-4858 Email: jphambleton@northwestern.edu
Teaching Assistants	Ms. Anastasia Nally, Office: Tech A140 Email: anastasia.nally@u.northwestern.edu Ms. Elham Ramyar, Office: Tech A323 Email: ElhamRamyar2022@u.northwestern.edu TA office hours and location*: MoTuWeTh 1:00-5:00pm in Tech MG45 MATLAB TA: Hyunjin Lee, Office hours: MoTu 1:00-3:00pm in Tech A123, Email: HyunjinLee2021@u.northwestern.edu Additional tutoring is available TuTh 5:00-8:00pm in Tech AG40 from scholars in the Department of Civil and Environmental Engineering. Details will be announced on the class website.
Lecture	MoTuWeFr 2:00-2:50pm, Abbot Auditorium, Pancoe-NSUHS Life Sciences Pavilion
Recitation	Th 2:00-2:50pm, Abbot Auditorium and Tech L361
Class Website	Northwestern Course Management System (Canvas) http://www.it.northwestern.edu/education/login.html
Textbook	Bedford, A., & Fowler, W. (2008). *Engineering Mechanics: Statics and Dynamics* (5th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.
Prerequisites	GEN_ENG 205-1; MATH 220-0 (or equivalent)

Course Objectives

- Introduce basic concepts in *engineering mechanics*, including statics and dynamics of particles and rigid bodies
- Understand the process of engineering analysis, in which fundamental concepts are utilized through a logical step-by-step method of *problem solving*
- Understand and apply the *mathematical tools* of engineering mechanics, namely vectors, linear algebra, and calculus
- Extend the *programming skills* introduced in Engineering Analysis 1 to make MATLAB an everyday tool for solving engineering design and analysis problems

* TA office hours are common to all sections of Engineering Analysis 2. The TAs assigned to our section will be available during specific periods (posted on Canvas) and can otherwise be contacted via email.

Course Assessment

Grades are determined based on the following components, weighted as indicated:

- 10% Homework and MATLAB projects
- 20% Midterm exam #1
- 25% Midterm exam #2
- 45% Final exam

Homework assignments will be collected within the first 5 minutes of class each Friday, after which they will no longer be accepted.

Due dates for the projects and exams are indicated in the course outline below. These due dates and exam dates are subject to change; any changes will be announced in the lectures and on the class website.

Advice and Additional Information

- Take advantage of office hours! This is time we have set aside to meet with students. All office hours will be posted on the class website.
- 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).
- 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 difficult if not impossible 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.
- Any student requesting accommodations related to a disability or other condition is required to register with AccessibleNU (accessiblenu@northwestern.edu; 847-467-5530) and provide professors with an accommodation notification from AccessibleNU, preferably within the first two weeks of class. All information will remain confidential.
- Additional support for this course can be accessed through the Searle Center for Advancing Learning and Teaching:
  - ❖ Quarter-long opportunities (registration required): Peer-Guided Study Groups (formerly AMP and GSW) offers peer-led academic support in a small-group setting for students enrolled in this course. If you join the program, you will meet weekly with about 5 to 8 other students and a peer facilitator – a student who has already taken and done well in the course. During sessions, students review concepts, work through practice problems, raise questions, and work together to develop answers. Students register for the full quarter on CAESAR, and attendance is expected weekly. Study group sessions are listed below course lecture and discussion sections (ex. CHEM 131-SG – CHEM 131-SG Peer-Guided Study Group: Quantitative Problem Solving in Chemistry). If you have any questions, contact Borislava Miltcheva at borislava.miltcheva@northwestern.edu.
  - ❖ Drop-in support (no appointment needed): Students can drop in to study alone or with others and ask questions of a peer leader who has done well in the class. This occurs on Sundays from 3–5 pm in the Shepard Engagement Center. Snacks provided! If you have questions about drop-in tutoring, please contact Una McGeough at una.mcgeough@northwestern.edu.

Course Outline

Week 1

Lecture 1	Mon, 1/8	Ch. 1: Introduction; Ch. 2: Vectors §2.1, §2.2, §2.3
Lecture 2	Tue, 1/9	Ch. 2: Vectors §2.4 (Dot product), Vectors §2.5 (Cross product)
Lecture 3	Wed, 1/10	Ch. 3: Forces §3.1 (Basics)
Recitation 1	Thu, 1/11	Review units and vectors
Lecture 4	Fri, 1/12	MATLAB for EA2; Project #1 assigned; **HW #1 due**

Week 2

NO CLASS	Mon, 1/15	Martin Luther King Jr Day (no classes)
Lecture 5	Tue, 1/16	Ch. 3: Forces §3.2 (2D force systems)
Lecture 6	Wed, 1/17	Ch. 3: Forces §3.2 (2D force systems)
Recitation 2	Thu, 1/18	Review 2D force systems
Lecture 7	Fri, 1/19	Ch. 3: Forces §3.3 (3D force systems); Project #2 assigned; **HW #2 due**

Week 3

Lecture 8	Mon, 1/22	Ch. 3: Forces §3.3 (3D force systems)
Lecture 9	Tue, 1/23	Ch. 4: Moments §4.1, §4.2, §4.3 (Moment basics)
Lecture 10	Wed, 1/24	Ch. 4: Moments §4.4 (Couples); §4.5 (Equivalent systems); **Project #1 due**
Recitation 3	Thu, 1/25	Review 3D force systems
Lecture 11	Fri, 1/26	Additional MATLAB for EA2; Project #3 assigned; **HW #3 due**

Week 4

Lecture 12	Mon, 1/29	Ch. 5: Objects in Equilibrium §5.1 (2D applications)
Lecture 13	Tue, 1/30	Ch. 5: Objects in Equilibrium §5.1 (2D applications)
Lecture 14	Wed, 1/31	Review for Exam #1; **Project #2 due**
Recitation 4	Thu, 2/1	Review moments and 2D applications
Exam #1	Fri, 2/2	**Midterm Exam #1**; Project #4 assigned; **HW #4 due**

Week 5

Lecture 15	Mon, 2/5	Ch. 5: Objects in Equilibrium §5.2 (Static indeterminacy)
Lecture 16	Tue, 2/6	Ch. 5: Objects in Equilibrium §5.3 (3D applications)
Lecture 17	Wed, 2/7	Ch. 5: Objects in Equilib. §5.4 (Two and three force members); **Project #3 due**
Recitation 5	Thu, 2/8	Review 3D applications
Lecture 18	Fri, 2/9	Ch. 6: Structures in Equilib. §6.1, 6.2 (Trusses, Method of joints); **HW #5 due**

Week 6

Lecture 19	Mon, 2/12	Ch. 6: Structures in Equilibrium §6.2 (Method of joints)
Lecture 20	Tue, 2/13	Ch. 6: Structures in Equilibrium §6.3 (Method of sections)
Lecture 21	Wed, 2/14	Ch. 6: Structures in Equilibrium §6.5 (Frames and machines); **Project #4 due**
Recitation 6	Thu, 2/15	Review two and three force members; Review trusses
Lecture 22	Fri, 2/16	Ch. 6: Structures in Equilibrium §6.5 (Frames and machines); **HW #6 due**

Week 7

Lecture 23	Mon, 2/19	Ch. 7: Centroids & Center of Mass §7.1, §7.2 (Comp. areas), §7.3 (Dist. loads)
Lecture 24	Tue, 2/20	Ch. 9: Friction
Lecture 25	Wed, 2/21	Ch. 13: Motion of a Point §13.1 (Position, velocity, and acceleration)
Recitation 7	Thu, 2/22	Review frames and machines, centroids, and friction
Lecture 26	Fri, 2/23	Review for Exam #2; **HW #7 due**

Week 8

Exam #2	Mon, 2/26	**Midterm Exam #2**
Lecture 27	Tue, 2/27	Ch. 13: Motion of a Point §13.2 (Straight-line motion)
Lecture 28	Wed, 2/28	Ch. 13: Motion of a Point §13.3 (P- and V-dependent acceleration)
Recitation 8	Thu, 3/1	Review position, velocity, and acceleration; Review straight-line motion
Lecture 29	Fri, 3/2	Ch. 13: Motion of a Point §13.4 (Curvilin. Motion—Cartesian); **HW #8 due**

Week 9

Lecture 30	Mon, 3/5	Ch. 13: Motion of a point §13.5 (Angular motion)
Lecture 31	Tue, 3/6	Ch. 13: Motion of a point §13.6 (Normal & tangential components)
Lecture 32	Wed, 3/7	Ch. 14: Force, Mass and Acceleration §14.1 (Newton's Second Law)
Recitation 9	Thu, 3/8	Review curvilinear and angular motion
Lecture 33	Fri, 3/9	Ch. 14: Force, Mass and Accel. §14.2 (Cartesian components); **HW #9 due**

Week 10

Lecture 34	Mon, 3/12	Ch. 14: Force, Mass and Acceleration §14.3 (Normal & tang. components)
Lecture 35	Tue, 3/13	Lecture content TBD
Lecture 36	Wed, 3/14	Review for Final Exam
Recitation 10	Thu, 3/15	Review PVA normal and tangential components, force, mass and accelerations
Lecture 37	Fri, 3/16	Review for Final Exam; **HW #10 due**

Final Exam: Wednesday, March 21, 12-2 pm, Location TBA