

ME 230 — Kinematics & Dynamics

Mechanical Engineering Department

University of Washington

Spring 2014

1 Course description

This course is an introduction to the study of kinematics and kinetics—that is, the *dynamics*—of particles and rigid bodies.

2 General information

2.1 classroom instruction

Location EEB 105

Times MWF 1:30–2:20

2.2 instructor & teaching assistants

Instructor: Rico Picone piconer@uw.edu

Office hours WF 2:30-3:30, MEB 102

Teaching assistants:

Rahul Warrierr (AA, Th 8:30) warrierr@uw.edu

Mark Jankauski (AB, Th 10:30) mjankaus@uw.edu

David Schipf (AC, Th 12:30) schipf@uw.edu

Amey Khanolkar (AD, Th 2:30) ameyk@uw.edu

2.3 websites

Course website: courses.washington.edu/mengr230/sp13

Canvas: canvas.uw.edu

2.4 homework policy

Weekly homework will be due by 4:30 Fridays, in the ME office (MEB 143). *No late homework is accepted.* All homework must be *timestamped* to receive credit. No electronic submissions will be accepted. The assignments listed below are subject to change. Check the website each week for an updated version of the assignment.

Working with groups is strongly encouraged, but all work must reflect the understanding of the student who turns it in. Copying is not tolerated.

2.5 exam policy

The midterm and final exams will be in-class. If you require any specific accommodations, please contact the instructor.

Calculators will be allowed. Only ones own notes and the notes provided by the instructor will be allowed. No communication-devices will be allowed.

No exam may be taken early. Makeup exams require a doctor's note excusing the absence during the exam.

The final exam will be cumulative.

2.6 grades

Grades will be curved. They will be available on [canvas](#) throughout the quarter. If you have any grading questions, please ask your TA.

Homework 50%

Midterm Exam 20%

Final Exam 30%

3 Textbooks

R. C. Hibbeler. *Engineering Mechanics: Dynamics*. Pearson Education, thirteenth edition, 2013.

Oliver M. O'Reilly. *Engineering Dynamics: A Primer*. Springer, second edition, 2010. ISBN 9781441963604. URL <http://link.springer.com/book/10.1007/978-1-4419-6360-4>.

Homework will be assigned from [Hibbeler \(2013\)](#) and [O'Reilly \(2010\)](#), but reading will be assigned from [O'Reilly \(2010\)](#), only. Note that [O'Reilly \(2010\)](#) can be downloaded by students for free (*if accessed from on-campus*) at the URL provided above.

4 Schedule

week	topics introduced	reading	assignment due
1	spacetime, particles, Euclidean Space, inertial coordinate systems, kinematics and kinetics of particles, Cartesian basis	O'Reilly (2010, Chapter 1)	
2	polar basis, space curves, Serret-Frenet formulae	O'Reilly (2010, Chapter 2, Sections 3.1 – 3.3)	O'Reilly (2010, Exercises 1.1, 1.5, 1.8) Hibbeler (2013, Problems 12-51, 12-96, 13-1, 13-13, 13-48)
3	applied space curves, Serret-Frenet basis, friction forces, spring forces	O'Reilly (2010, Sections 3.4 – 3.6, Chapter 4)	O'Reilly (2010, Exercises 2.1, 2.4, 2.5, 3.1) Hibbeler (2013, Problems 12-163, 12-175, 12-179, 13-86, 13-95)
4	power, work, energy (single particle)	O'Reilly (2010, Chapter 5)	O'Reilly (2010, Exercises 3.6, 3.9, 4.1, 4.3) Hibbeler (2013, Problems 12-121, 12-123, 13-52, 13-72, 13-84)
5	linear and angular momenta, impulses, collisions	O'Reilly (2010, Chapter 6)	midterm exam (Monday, April 28) O'Reilly (2010, Exercises 5.3, 5.4) Hibbeler (2013, Problems 14-6, 14-9, 14-12, 14-22, 14-42)
6	systems of particles, momenta, energy, center of mass	O'Reilly (2010, Chapter 7)	O'Reilly (2010, Exercise 6.2) Hibbeler (2013, Problems 15-30, 15-42, 15-57, 15-70, 15-93)
7	rigid bodies, kinematics of a rigid body	O'Reilly (2010, Sections 8.1 – 8.4)	O'Reilly (2010, Exercises 7.4, 7.8) Hibbeler (2013, Problems 14-18, 14-40, 15-43, 15-55)
8	kinematics of a rigid body	O'Reilly (2010, Sections 8.5 – 8.10)	O'Reilly (2010, Exercises 8.1, 8.2, 8.5) Hibbeler (2013, Problems 16-1, 16-21, 16-42, 16-49)
9	kinetics of a rigid body	O'Reilly (2010, Sections 9.1 – 9.4)	O'Reilly (2010, Exercise 8.6, 8.7) Hibbeler (2013, Problems 16-58, 16-62, 16-111, 16-119, 17-34, 17-39, 17-43)
10	kinetics of a rigid body	O'Reilly (2010, Sections 9.5 – 9.8)	O'Reilly (2010, Exercise 9.3) Hibbeler (2013, Problems 17-25, 17-29, 17-68, 17-70, 17-95, 17-116, 18-17)
11			final exam (Monday, June 09, 2:30-4:20, EEB 105)