

University of California at Berkeley
Department of Mechanical Engineering

ME 104: Engineering Mechanics II

Spring Semester 2021

Lectures: MWF 4:10-5:00, Zoom

Discussion Sections: 101, Tu 1:10-2:00
102, Th 2:10-3:00

Instructor: J. Casey
6125 Etcheverry Hall, jimcasey@berkeley.edu

GSI's: Theresa Honein, Theresa_honein@berkeley.edu

Jason Byun, jaeseungbyun@berkeley.edu

Reader: Michael Vronsky, Michaelvronsky@berkeley.edu,
Matthew Morozov, mmorozov@berkeley.edu

Office Hours: Casey: Tuesdays and Thursdays 2:30-3:30, Zoom
Honein: Mondays 11:00-12:30 and Fridays 10:00-11:30am, Zoom
Byun: Tuesdays and Thursdays 11:00-12:30, Zoom

Approximate Grading Scheme:	Homework	30%
	Midterm Exam 1	15%
	Midterm Exam 2	15%
	Final Exam	40%

Homework: Homework will be usually due weekly on Friday, midnight PST. If you need an extension, email Theresa or Jason; HW will not be accepted after

solutions are posted. (Check the due date on each HW set, as some sets may be longer than others.) See guidelines for further details.

Textbook: J.L. Meriam, L.G. Kraige, and J.N. Bolton, *Engineering Mechanics: Dynamics*, 9th Edition, John Wiley & Sons, Inc., 2018; WileyPlus etext.

Exam Dates: Midterm 1.....TBA
Midterm 2.....TBA
Final..... Friday, 14 May 8:00-11:00 AM

Mental Health and Wellness: All students — regardless of background or identity — may experience a range of issues that can become barriers to learning. These issues include, but are not limited to, strained relationships, anxiety, depression, alcohol and other drug problems, difficulties with concentration, sleep, and eating, and/or lack of motivation. Such mental health concerns can diminish both academic performance and the capacity to participate in daily activities. In the event that you need mental health support, or are concerned about a friend, UC Berkeley offers many services, such as free short-term counseling at University Health Services. An excellent campus website having links to many resources

is: <http://recalibrate.berkeley.edu/>. Another campus website addressing mental health services in specific reference to this time of the coronavirus pandemic

is: <https://uhs.berkeley.edu/coronavirus/student-mental-health>

Remember that seeking help is a good and courageous thing to do — both for yourself and for those who care about you.

<i>Topic</i>	<i>Sections in Book</i>
1. INTRODUCTION	
Basic concepts, Newton's and Euler's laws	1/1-1/8, 3/1-3/2
2. KINEMATICS OF A PARTICLE	
A particle moving in space	2/1-2/4
Radial and transverse components	2/6-2/7
Tangential and normal components	2/5
Relative motions, translating frames of reference	2/8

Constrained motions 2/9

3. DYNAMICS OF A PARTICLE

Newton's laws 3/1-3/3

Rectilinear motions 3/4

Curvilinear motions 3/5

Work, power, kinetic energy 3/6

Conservative force fields, potential energy 3/7

Linear momentum, linear impulse 3/8-3/9

Angular momentum, angular impulse 3/10

Impact 3/12

Central forces 3/13

Non-inertial frames of reference 3/14

4. DYNAMICS OF A SYSTEM OF PARTICLES

Dynamics of a system of particles, Euler's laws 4/1, 4/2, 4/4

Work and energy relations 4/3

Conservation principles 4/5

Control volume, steady mass flow 4/6

Mass ingestion/expulsion, rocket propulsion 4/7

5. PLANE KINEMATICS OF RIGID BODIES

Rigidity, translations, rotation tensor, angular velocity,
velocity field, acceleration field 5/1-5/4

Instantaneous center of zero velocity	5/5
Relative acceleration	5/6
Moving frames of reference, corotational bases and corotational Rates, Coriolis acceleration	5/7

6. PLANE DYNAMICS OF RIGID BODIES

Euler's laws for rigid bodies. The inertia tensor.	6/1-6/3, Appendix B
Rotation about a fixed axis	6/4
General plane motions	6/5
Work and energy relations	6/6
Momentum, impulse	6/8

8. VIBRATIONS

Free vibrations of a spring-mass system. Damping.	8/1-8/2
Forced vibrations, resonance	8/3
Vibrations of rigid bodies	8/4
Vibrations of conservative systems	8/5
