

DYNAMICS

ENGR 240 – Section 77027
Santa Ana College; Department of Engineering
Spring 2026

Class Meetings: Wednesday, 10 am - 1:10 pm Room A-215
Units: 3
Instructor: Craig Takahashi, Ph.D. takahashi_craig@sac.edu
Office hours: provided in class

Description:

Fundamentals of kinematics and kinetics of particles and rigid bodies. Topics include kinematics of particle motion; Newton's second law, work-energy and momentum methods; kinematics of planar motions of rigid bodies; work-energy and momentum principles for rigid body motion; introduction to mechanical vibrations.

Learning Outcomes

Students will be able to:

1. Derive and apply kinematics equations of a particle in rectilinear and curvilinear plane motion.
2. Use Newton's laws to solve motion or forces of a particle and rigid body in plane motion
3. Use work/energy and impulse/momentum methods to solve motion or forces of a particle and rigid body in plane motion

Textbook & Materials

1. Vector Mechanics for Engineers – Dynamics; Beer and Johnston; McGraw Hill, 10th edition, 2012, ISBN13: 978-0077402327, ISBN10: 0077402324, (REQUIRED) (International versions NOT acceptable!).

Grading

Grading is determined on a percentage system, not on a curve. Note – I do not GIVE out grades, you EARN them! Grading is based on mathematical computation, not by my manipulation or your life circumstances. A final score within 0.5% of the next higher grade is rounded up (e.g., 79.50% = B; 79.49% = C). A final score within 1.00-0.51% of the next higher grade, will round up to the next grade (e.g., 79.0 to 79.49% gets a B) ONLY IF the student does not “miss” (i.e., score < 50%) on more than 1 assignment for the whole semester. NO score > 1% from the next higher grade will round up (e.g., 78.9999 gets a C no matter what).

Grading Scale	Weighting of grades
A = 90 – 100%	Exams 75%
B = 80-89% D = 60-69%	Homework 25%
C = 70-79% F < 60%	

Tentative Spring Schedule

Wk	Date	Topic	Wk	Date	Topic
1	2/11	Introduction Syllabus, studying, vectors, vector components, unit vectors	9	4/15	Systems of Particles (Ch 14) Momentum, mass center, kinetic energy, work Hw 7 due - see website
2	2/18	Particle Kinematics (Ch 11) Coordinate frames, motion, velocity, acceleration	10	4/22	Rigid Body (RB) Kinematics (Ch 15) Velocity, translation, rotation about axis, relative veloc, instant. center Hw 8 due - see website
3	2/25	Particle Kinematics II(Ch 11, cont) Rectilinear, curvilinear motion Hw 1 & 2 due - see website	11	4/29	Exam 2 (posted material – see website)
4	3/4	Particle Kinetics (Ch 12) Newton's Laws, linear momentum Hw 3 due - see website	12	5/6	RB Kinematics II (Ch 15, cont'd) abs/rel acceleration, rotating frames Hw 9 due - see website
5	3/11	Particle Kinetics II (Ch 12, cont'd) Angular momentum, gravitation Hw 4 due - see website	13	5/13	RB Kinetics (Ch 16) Ang momentum, Hdot, constrained motion Hw 10 due - see website
6	3/18	Exam 1 (posted material – see website)	14	5/20	RB 2D energy/momentum (Ch 17) Work, kinetic energy, E conservation, power, impulse Hw 11 due - see website
7	3/25	Work & Energy (Ch 13) Work, energy, power, conservative forces, Hw 5 due - see website	15	5/27	Mechanical vibrations (Ch 19) Pendulum, free/forced vibrations Hw 12 due - see website
8	4/1	Impulse/Momentum (Ch 13, cont) Impulse, momentum, impact Hw 6 due - see website	16	6/3	Exam 3
SpB	4/8	(Spring Break: 3/25 – 3/31)			

Online Communication

Students must be capable of electronic communication.

Course Website - most course items are posted on a course website (provided in class), NOT Canvas.

Canvas - students must know Canvas (rscdd.instructure.com/login/ldap), a web based course management software. Contact Distance Education (714-564-6725, Room A-101, sac_disted@sac.edu) for Canvas issues. Canvas is mainly used to post grades and, for some classes, also to submit work and take exams (note - transfer classes like 235, 240, 250 have exams on paper). Canvas use is subject to change based on instructor discretion.

Email - I regularly send class-wide emails using email addresses from the SAC enrollment system (Self Service), not Canvas, so you MUST have a valid email on this system. Students who miss emails (e.g., not checked, or incorrect/inactive email indicated on SAC system) must obtain the information from classmates.

When emailing me, always indicate which class you are in (E.g. Engr 235). If you change your email address in SAC enrollment system, notify me by email, indicating the class of mine you are in.

It is YOUR responsibility to check Canvas, the course website, and email regularly.

Assessments:

- *Homework* - submissions may be in class (due at start of class) or digital uploads to Canvas (due dates/time specified on Canvas) as determined by instructor. Late work receives no credit. Paper submissions must be on WHITE COPY PAPER & be labeled in the upper right of the front sheet with student first & last name, course #, & hw # (e.g., John Doe, Engr 100A, hw #1). Digital notes (eg - One Note) are fine but print on plain white paper and black writing. Engineering paper, graph or heavy lined paper is not acceptable as it is hard to see your work. Work must be submitted with problems in the order assigned and with upright orientation or points will be deducted. Emailed work and work attached in comments on Canvas are not accepted. The lowest assignment score will be dropped (Canvas drops the lowest grade automatically from day one). For **transfer classes (235, 240, 250)** the instructor will determine if hw is submitted on paper or by digital submission. This may change during the semester. Hw format and upload requirements will be discussed in class & must be met for full credit. Students having trouble meeting upload requirements may be required to submit work on paper.
- *Exams* - (**3 exams**) exams must be taken during the allotted time (not before, not after) in class. Missed exams receive a score of 0. There are NO MAKE-UP EXAMS (exams not taken during the allotted time). An EXAM SCORE SUBSTITUTION (ESS) may be requested but is granted at the instructor's discretion. Students must submit ESS request within 1 week of the missed exam. An ESS substitutes the missed exam score with the lowest of the remaining earned exam scores minus 15% (regardless of the cause of the missed exam). Students must provide documentation to verify the cause of the missed exam. ESS's will NOT be granted to anyone with excessive absence (>10%), insufficient participation (>10%) of graded work scoring < 50%), or a previous ESS. An ESS will not be granted for the last exam.

Course policy and conduct

- *Academic Honesty* - students are encouraged to communicate with classmates about course concepts (e.g., study groups) but may only turn in their own work. Graded work (assignment, exam, etc.) deemed plagiarized or copied receives a score of 0 (for both the copier and the one who allowed the copying). More generally, academic honesty policy of this course, including any resulting disciplinary action, is per the college catalog.
- *Grading* - students may challenge a grade on a graded work by submitting a GRADE REVIEW request using the following procedure: *Type* the request with a cover sheet having your full name, student number, date, description of the work in question, detailed explanation of why you feel the grade was incorrect, and a rationale for a higher score (using sketches or drawings if necessary). Submit the request within 1 week of the work being returned (except work in the last week of class, where it must be submitted within 2 days). A review evaluates the *entire* assignment, not just the questionable issue. Thus, a review may result in a lower overall score. Grades incorrectly entered on Canvas do not require a review, but students must notify instructor within 7 days of the grade posting (show or email a picture of the grade on the work). Students must use techniques and methods taught in THIS class for full credit. Partial credit is at instructor's discretion.
- *Attendance/absences* - the instructor has the authority to drop any student for excessive absence as defined in the college catalog. Class meetings missed prior to adding class are also considered absences. Attendance is based on when the instructor takes roll, but it also requires student presence for the entire meeting time. Students are considered absent if they arrive late, leave early, or disappear in-between. Students who miss class are to obtain any missed material from a classmate.

- *Lack of participation drop & grade policy* - the instructor has the authority to drop students for lack of participation per the college catalog. Participation means turning in graded assignments & taking exams. Graded work scoring < 50% is considered "missed." Any student missing any exam may be dropped for lack of participation. Attending class alone is not participation.
- *Withdraws* - students are responsible for dropping themselves from courses they no longer wish to complete. Withdraw policies, including withdraw deadlines, are specified in the college catalog. Dropped students may be reinstated at the instructor's discretion.
- *Student with Disabilities* - students requesting academic accommodations for a verifiable disability must provide the instructor an official SAC DSPS (Disabled Student Programs & Services) form completed and signed by SAC DSPS officials. Submit this form in the first 2 weeks of class. NO accommodations will be provided prior this submission. NO accommodations will be provided unless the form is submitted to instructor at least 2 days to the graded activity, and the student and instructor have met to discuss the accommodations.
- *Cell Phones or Technology* - Silence cell phones. Disruptive students may be removed from class. No recordings (e.g., audio or video) are permitted without prior instructor approval.
- *Food* - food and drink are not permitted in the classrooms. Water in a closable container is okay.
- *Other* - any student claims about something I verbally "allowed" (e.g., "you said there was no hw", "you said I could miss most of the lecture", etc.) must be substantiated with some type of verifiable documentation (usually an email from me). If it isn't documented, it didn't happen. Missed work gets a 0.
- *Digital submissions* - some work may be submitted digitally. Students must have the ability to produce digital documents (usually jpg or pdf, and for videos, mp4) and upload those to Canvas. The instructor will provide further details on the rules for submitting work on Canvas. Documents must be uploaded properly for full credit.
- *Illness procedures* - avoid coming to class if you are sick (covid or any other respiratory or contagious illness). The instructor will try work with you to figure out how to accommodate lost class time due to illness. Cover coughs and sneezes. Please wear a mask & try to maintain social distance from other people.

Engineering Dept Mission Statement: Santa Ana College engineering department prepares students for university transfer or employment in engineering and engineering-related fields.

SAC Mission Statement: Santa Ana College inspires, transforms, and empowers a diverse community of learners.