Course topics: Covers the theory and application of mathematical models to analyze the kinematics and dynamics of robot mechanisms or their components using vector algebra, differential equations, and computer simulations; also covers robot vehicle kinematics, robot arm kinematics, and robot dynamics with computational examples and problems. Some basic programming skills and familiarity with MATLAB are expected. Prerequisite(s): The prerequisites are listed at: https://courses.soe.ucsc.edu/courses/cmpe10

*Students are advised to regularly check the course webpage for updates.

Tentative week-by-week course plan:

Week 1  Introduction (1.1-1.6), Vectors,
         Position and orientation in 2D (RVC: 2.1)
Week 2  Position and orientation in 3D (RVC: 2.2.1.1-3, 2.2.1.5),
         Kinematics of Particles (Rectilinear Motion: 11.1-11.6), Project 1
Week 3  Kinematics of Particles (Curvilinear Motion: 11.9-11.14)
Week 4  Kinematics of Rigid Bodies (15.1-15.14), Project 2
Week 5  Kinematics of Rigid Bodies (15.1-15.14)
Week 6  Kinematics of Wheeled Ground Robots, Project 3
Week 7  Robot Arm Kinematics (Selected Sections from RVC: 7 and 8),
Week 8  Systems of Particles (14.1-14.9), Moment of Inertia (9.11-9.15)
Week 9  Lagrange’s equations: Examples, Project 5
Week 10 Plane Motion of Rigid Bodies: Forces and Accelerations (16.1-16.8)

**Lecture notes** will be posted on this course webpage under the link "Course Material"\(^1\). Audio/video recording of the class is not permitted.

**Homework** will be posted on the course webpage. Homework deadlines are firm; NO LATE homework will be accepted for any reason. Your weakest three homework scores will be dropped. Also, if you do not have all of the homework done, turn in what you have managed to do by the deadline. All questions regarding the homework solutions should be addressed to the TA. Please bear in mind that your scores will be heavily based on the quality and completeness of problem solutions, and not only on their correctness. All submitted work should be done individually.

**Projects** will be posted on the course webpage. Project deadlines are firm; NO LATE project will be accepted for any reason (late submissions will score 0). All five projects are mandatory. The total score on the projects contribute 30% of the final grade. Please note that your scores will be heavily based on the quality and completeness of problem solutions, and not only on their correctness. All submitted work should be done individually.

**Final grade** will be based on your homework, projects, final exam, and class attendance above 70% (homework 20%, projects 30%, final 45%, attendance 5%). If your score on the final exam is lower than 50, and your overall score in the class is higher than 77, then your grade will be C+ regardless of the overall score in the class. In all other cases, the ranges from the table on the class webpage apply. No show on the final exam and/or the exam work not submitted to the instructor scores 0.

Bring your student ID to the final exam.

**E-mail:** It is essential that your e-mail message contains a proper salutation. In addressing me, both in person and by e-mail, please use the appropriate title, which is Professor. Always use your ucsc e-mail addresses in your correspondence with me.

**For DRC students:** If you qualify for classroom accommodations because of a disability, please get an Accommodation Authorization from the Disability Resource Center (DRC) and submit it to me in person outside of class (e.g., during office hours) **within the first two weeks of the quarter.** Contact DRC at 459-2089 (voice), 459-4806 (TTY), or http://drc.ucsc.edu for more information.

\(^1\)Please note that students may be disciplined for selling, preparing, or distributing course lecture notes for any commercial purpose, whether or not the student himself or herself took the notes.
on the requirements and/or process.

Note: For any questions, I am available in the class and during my office hours.

**Cheating:** Cheating in any form will not be tolerated. Cheating devalues everyone’s grades:

- you shouldn’t tolerate it either
- students who help others cheat are also cheaters.
- students caught cheating will be dropped from the course and receive a failing grade.
- such students will also be reported to the department chair. Please bring your student ID to the final exam.

Academic integrity: By enrolling in the university, students are automatically agreeing to abide by policies, including those on academic misconduct. Academic integrity and scholarship are core values that should guide our conduct and decisions as members of the UCSC community. Plagiarism and cheating contradict these values, and so are very serious academic offenses. Penalties can include a failing grade in an assignment or in the course, or suspension or expulsion from the university. Students are expected to familiarize themselves with and follow citation practices (http://nettrail.ucsc.edu/ethics/index.html) and the university’s Rules of Conduct regarding student conduct and discipline: http://www2.ucsc.edu/judicial/handbook.shtml.