

MECHATRONICS I

ENGR 133 – Section 46074
Santa Ana College, Department of Engineering
Fall 2024

Lectures: Tuesday 9 am – 1 pm Room SC-134
Units: 3
Instructor: Craig Takahashi, Ph.D. takahashi_craig@sac.edu
Office/office hours: provided in class

Description:

A first course in mechatronics. Topics emphasize hands-on work and include: solid modeling design, micro-controllers and programming, rapid prototype fabrication, testing, measurement, actuators, sensors, and basic electronics. Prior experience with Solidworks, Arduino, and basic algebra is suggested but not required.

Textbook & Materials

Students are required to purchase materials for lab and project work (Arduino kit, >\$35), digital multi-meter (>\$15), some wood. Don't purchase yet - instructor will provide specifics in class.

Student Learning Outcomes

Students will be able to:

1. Use various rapid prototyping fabrication equipment
2. Program a micro-controller to read a sensor and control an actuator

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%	Lab Assignments 40%
B = 80-89% D = 60-69%	Exams 30%
C = 70-79% F < 60%	Final Project 20%
	Homework 10%

Tentative Schedule (FALL)

Wk	Date	Topic	Wk	Date	Topic
1	8/20	Intro Engr, Safety/Lab care Hw 1 – syllabus Lab lec - Ard (ide, prog), C (basic, compiling)	9	10/15	Lab 6 - Light-controlled Servo Lab lec - Solidworks (SW)
2	8/27	Electricity / Arduino intro Lab 1– Arduino blink (Ard I/O, prog)	10	10/22	Lab 7 - SW and laser Exam 3
3	9/3	Electric Circuits Lab 1 – Arduino blink (cont'd) Hw 1, 2 (get Arduino) due (Ard serial monit, math, wire,dmm) Exam 1 - Safety	11	10/29	Lab 8 - Servo PID Lab lec - PID, soldering
4	9/10	Micro-controllers Lab 2 – DMM, Bb, Rs (DMM, cutter/stripper)	12	11/5	Lab 9 - Soldering Hw 3 due - SW model
5	9/17	Lab 3 - Laser wood (timer, if logic,	13	11/12	Project work Exam 4
6	9/24	Arduino / programming Lab 4 - Servo	14	11/19	Project work
7	10/1	Exam 2	15	11/26	Project work Hw 4 due - survey
8	10/8	Lab 5 - Light detection Lec - units, conv?	16	12/3	Project Presentations Exam 5

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 (rsccd.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 & may possibly be used submit work, and conduct exams for some classes (except for transfer classes like 235, 240, 250 where exams are written on paper). Canvas utilization 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., don't check them or have incorrect/inactive email 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:

- *Lab assignments* – generally involve getting equipment to function as instructed. Student will either demonstrate the lab working as required in class (due in class) or possibly a video/pic upload to Canvas showing the lab working (due date/time specified in Canvas). The instructor will inform you which submission to use. Late work not accepted. The lowest **lab** grade is dropped.
- *Homework* – submissions may be in class (due at start of class) or uploads to Canvas (due on date/time specified on Canvas). The instructor will inform you which submission to use. Late work not accepted. Label paper work in the upper right of the front sheet with student first & last name, course #, & hw # (e.g., John Doe, Engr 100A, hw #1). Work not submitted with problems in order assigned or not in upright orientation will lose points. Hw scores are NOT dropped for **133 & 134**. Emailed work and work attached in comments on Canvas are not accepted (hw or lab).
- *Exams* - (**5 exams**) exams must be taken during the allotted time (not before, not after). There are NO make-up exams. Instead lowest exam score is dropped. Exams must be taken in class.
- *Projects* – (see tentative schedule) - NO late projects!
- *Lab work, conduct, safety* – (applicable to classes with a lab or hands-on activities) lab work is related to completion of hands-on exercises. Part of your lab grade is "lab conduct", which is based on how well students clean up, stay organized, and maintain lab safety. Lab safety is critical in a lab environment & it is part of your grade. Safety procedures handouts will be provided. Students must pass a safety exam prior to using the lab. Students must report any safety infractions by submitting a mandatory incident report to the instructor. Students who fail to report or who have repeated incidents may lose their lab privileges. Students who do not demonstrate the ability to work safely in lab may be restricted from using equipment and tools as determined by the instructor. All fabricated parts must have instructor pre-approval. Inappropriate items (weapons parts, offensive items, etc.) are prohibited.

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, the review may result in a lower overall score. Grades incorrectly entered on Canvas do not require a review, but inform me within 7 days of the grade posting (show or email a picture of the grade on the work).
- *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 class. Students are considered absent if they arrive late, leave early, or disappear in-between. Students who miss class must 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." 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 first be evaluated by Disabled Student Programs & Services (DSPS; x6260, 6384 TDD for deaf students, U103) for authorization, and the student must inform the instructor within the first 2 weeks of class.
- *Cell Phones or Technology* – Silence cell phones. Disruptive students may be removed from class. Students may not make recordings (e.g., audio or video with a cell phone) in the classroom without prior instructor approval.
- *Food* – students may not bring food or drink into 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 (e.g. – email from me). If it isn’t documented, it didn’t happen. Missed work gets a 0. Under extreme circumstances the instructor may at his discretion "not count" missed work if student provides documentation.
- *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.
- *Illness procedures* – please do not come to class if you are sick (covid or any other respiratory 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.

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

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