

# EECS192 Mechatronics Design Laboratory

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Office Hours: Wed 11 am - 1 pm or by appointment.

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Class meeting: 11:00 - 12:30 pm 293 Cory Hall.

Lab lecture/demo Wed. 2:00 – 3:00 pm, Thur. 11:00-12:00 pm 204 Cory Hall, Checkoffs Friday 1:30 – 2:30 pm. At least one team member must be present to demonstrate functionality.

Grading: 18% checkoffs, 20% final exam, 18% oral and written reports, 5% written assignments, 10% first round contest, 20% second round contest, 4% community spirit, 5% in class 10 min quizzes.

Recommended Texts: (on reserve in Engineering Library) *Mechatronics: mechanical systems interfacing* by D.M. Auslander; *Analytical robotics and mechatronics* by W. Stadler; *Robotic engineering: an integrated approach* by R.D. Klafter; *The Art of Electronics* by Horowitz and Hill.

Suggested References: *Introduction to Mechatronics Design* by J.E. Carryer, R.M. Ohlnie, and T.W. Kenny. Please check the class web page: [www-inst.eecs.berkeley.edu/~ee192](http://www-inst.eecs.berkeley.edu/~ee192) for announcements, class handouts, pointers to data sheets etc.

lecture	Lecture and demo topics	Project checkpoint
1/22	Introduction to Mechatronic design, proj. description, FRDM-KL25Z overview Demo: soldering I, FRDM-KL25Z, car	Team formation
1/29	Motors and motor control, RFDm-KL25Z IO, electronic construction practices Demo: soldering II, Solidworks, test equipment	Hello World, LED blink
2/5	PWM, H Bridge, power MOSFET Demo: RC servo, motor circuit	Written project proposal due Fri. 2/8, car chassis clean and checked
2/12	RC servo, RFDm PWM, Power Supply I Demo: power tools, power supply waveforms	CPU turns motors on/off (on bench - stalled) CPU turns from wheel left/right
2/19	Power Supply II Demo: power filtering	Drive motor from battery PCB #1 due Fri. 2/22
2/26	Optical encoders, line camera, magnetic sensors A/D Demo: quadrature encoders, EM field sensing	CPU board, stalled motor and RC servo from battery
3/5	Analog design, line sense intro Demo: band pass filters, detectors	Drop and run test, open loop Figure 8 (PCB on car) w e-stop <b>Lab clean</b>
3/12	Line sensing conc., velocity control Demo: A/D, noise/shielding	Bench top line following, drop and run
3/19	Steering control Demo: proportional, PI velocity/steering control	Closed loop Figure 8 line following, drop and run outside track setup PCB #2 due Fri. 3/22
3/26	Spring Break	Spring Break
4/2	Steering and feed forward control, off track dead reckoning	Velocity control, Figure 8 (> m/sec). sensor mech. response <b>Lab clean</b> Progress report due Fri. 4/5
4/9	Discrete time control and filtering Demo: speed adaptation	Practice course and step response Assignment #1 due Fri. 4/12
4/16	HW and SW robustness	Round 1: Friday 4/19 Cal Day: Saturday 4/20
4/22	Freescale cup – UC Davis (optional)	
4/23	Mechatronic system examples I	
4/30	Mechatronic system examples II	Round 2: Monday 4/29/3
5/2, 5/3	Student oral reports	
5/8	Optional final review	
5/16	Final exam – Thu. 5/16 8-11 am	
5/20	NATCAR contest - UC Davis 10-4 pm (optional)	