

Design Problems Grading Rubric (SP2026)

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DP3 Rubric

Note: Do not double dip, i.e., there should be no deduction propagation across sub questions.

- (5 points) Selecting the correct state, control, and output variables.
- (5 points) Selecting a valid desired point (equilibrium point) (3 points) and showing that it is indeed a valid equilibrium point (2 points).
- (5 points) Linearization – writing A, B, C, D matrices in the report including the steps involved in the process.
- (5 points) Requirements and verification. (2.5 points) Selecting a reasonable requirement. (2.5 points) Selecting a reasonable verification.
- (10 points) Verifying controllability (5 points) and observability (5 points) - by checking (and noting in the report) the rank of the controllability and observability matrices.
- (10 points) Designing a stable controller and a stable observer and showing that they are asymptotically stable - nearly full points if the report demonstrates that the student put in an honest effort to design a valid controller and observer even if the controller itself is not completely working as intended.
- (10 points) Trajectory tracking. (5 points for bad controller)
- (10 points) Plugging in the controller in code and generating results
 - the student should understand how state from simulator has to be offset with the equilibrium values before passing to the controller and then how control input from controller need to be offset with equilibrium values before applying to the simulator
 - should provide valid working code
 - should generate any results they mention in the report
- (5 points) Including in-depth analysis of a single run (with failure analysis).
- (10 points) Including breadth analysis of aggregate results from at least 30 simulations (atleast 4 plots).

- (15 points) Video.
- (10 points) Report Formatting – full points if it is a \LaTeX report and appeared to roughly following all stated guidelines and the given template.