

# MECH6325 - Optimal Estimation and Kalman Filter

[MECH 6325](#) ([SYSE 6325](#)) Optimal Estimation and Kalman Filter (3 semester credit hours) Theory, analysis, design, and implementation of Kalman filters are covered in this course together with real-world applications of the theory. Topics include a review of probability and random variables; random signals and random processes; response of linear systems to random signals; the Wiener filter; the discrete-time Kalman filter; continuous-time Kalman filter; prediction and smoothing; the extended Kalman filter; the ensemble Kalman filter; the unscented Kalman filter; case studies in GPS and GPS-aided inertial navigation, simultaneous localization and mapping (SLAM), and amplitude and phase estimation in dynamic mode atomic force microscopy (AFM). Prerequisite: [MECH 6300](#) or instructor consent required. (3-0) R