

Discrete-Time Kalman Filters, September–November 2011

Date	Topics	Pages in \mathcal{L}	M-files
8/9	Least squares procedure, weights, covariance propagation, decorrelation	72–99, 165–168	b_row, k_update, wc
15/9	Elimination of unknowns from the observation and the normal equations, constrained least-squares problems	162–165, p403.pdf	clsq, elimnor, elimobs, wlsq
22/9	Recursive least squares, recursive update for a static one-parameter problem	203–209	rec_1sq
29/9	Block matrix identities, derivation of the Kalman filter: updates of the covariance and the gain matrices; weights	218–222, handout	ex8, k_update
6/10	State updates, Bayes filter for batch processing	223–230	k_dd3, dds26_*.dat
13/10	Smoothing	230–234	rts, smoother
27/10	Extended Kalman filter, correlated state and observation noise	243–246	kalclock, rec_cloc
3/11	Motion of a vehicle, quality control		ex1611, abs_pos
10/11	Random processes in discrete time, examples		one_way, fixing1
1/12	Observability, controllability, augmentation of state vector	248–251	observa

Literature:

Kai Borre & Gilbert Strang (2012): *Algorithms for Global Positioning* (\mathcal{L})

Optional literature:

Arthur Gelb et al. (1974): *Applied Optimal Estimation*

Thomas Kailath, Ali H. Sayed, and Babak Hassibi (2000) *Linear Estimation*. Prentice Hall, New Jersey

M-files can be found at gps.aau.dk/~borre/kalman

All lectures are given in room 2-103 at Fredrik Bajers Vej 3 from 10:15 am to 12:00 am.