Course schedule
TTK4250 - Sensor fusion - Autumn 2017

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All the 3 Matlab assignments must be accepted. At least 4 of the remaining 6 assignments must also be accepted.

Calendar

Week	#	Lecture	Material	Guidance	Handout	Handin
34	1	**Probability** and **estimation**.	Ch 2	Yes	1	-
35	2	**The multivariate Gaussian**: The role of quadratic forms. Independence, linearity, marginalization, conditioning. The product identity. Canonical form. **The Kalman filter**: Bayesian interpretation.	Ch. 3, Ch. 4.1-4.2.	Yes	2	1
36	3	Stochastic processes. **The Kalman filter**: Tuning the noise matrices. **The EKF**. **Particle filters**: Importance sampling, trajectories and resampling.	Ch. 4.3-4.7, Ch. 5.1-5.3.3.	Yes	3	2
37	4	**Particle filters**: Improved proposal densities. **Gaussian mixtures**. Hybrid systems and **Interacting multiple models** (IMM).	Ch. 5.3.3-5.3.6, Ch. 6.	Yes	4	3
38	5	**Single-target tracking**: Data association and The PDAF. The IPDA. The IMM-PDAF.	Ch. 7.	Yes	5 (Matlab)	4
39	6	**Multi-target tracking**: The standard model for multi-target tracking. The JPDA. Murty's method and the Auction algorithm.	Ch. 8	Yes		
40	7	**Multi-target tracking**: The multiple hypothesis tracker (MHT). Multi-scan association hypotheses. Reid's MHT. Track-oriented MHT, integer programming and Lagrangian relaxation.	Ch. 9	Yes	6	5
41	8	**Attitude representations** for inertial navigation: Quaternions, rotation matrices, axis-angle and Euler angles.	Ch. 12.1	Yes	7 (Matlab)	6
42	9	**The error-state Kalman filter**: Dead reckoning (Sola's formulation).	Ch. 12.2	Yes		
43	10	**The error-state Kalman filter**: Measurement update (Sola's formulation).	Rem. of Ch. 12.	Yes	8 (Matlab)	7
44	11	**SLAM**: Standard formulation of the SLAM problem. EKF approach to SLAM. Data association for SLAM.	Ch. 13.1-13.4.	Yes		
45	12	**SLAM**: Rao-blackwellization. Particle filtering approach to SLAM (FastSLAM 1.0 and FastSLAM 2.0).	Ch. 13.5.	Yes	9	8
46	13	**SLAM**: Smoothing and graphical models. Information filters. Graph-based SLAM methods.	Ch. 13.6, Ch. 14	Yes		
47	14	**Repetition.**				9
50	-	Questions session.	-	-	-	Exam: Fredag 13/12

Time and place

Lectures : Mondays 8:15 - 10:00 in R8 / Tuesdays 15:15 - 16:00 in EL6

Assignments : Tuesdays 16:15 - 19:00 in S3

Literature

The textbook for the course is *Fundamentals of sensor fusion* currently written by the lecturer. Relevant chapters will be handed out on Blackboard ahead of the lectures. The lecture notes and the assignments are also part of the curriculum.