Module MA-INF 3233	**Advanced Sensor Data Fusion in Distributed Systems**				
Workload 180 h	**Credit points** 6 CP	**Duration** 1 semester	**Frequency** every year		
Module coordinator	PD Dr. Wolfgang Koch				
Lecturer(s)	Dr. Felix Govaers				
Classification	**Programme** M. Sc. Computer Science	**Mode** Optional	**Semester** 2.		
Technical skills	For challenging state estimation tasks, algorithms which enhance the situational awareness by fusing sensor information are inevitable. Nowadays it has become very popular to improve the performance of systems by linking multiple sensors. This implies some challenges to the sensor data fusion methodologies such as sensor registration, communication delays, and correlations of estimation errors. In particular, if the communication links have limited bandwidth, data reduction techniques have to be applied at the sensor sites, that is local tracks have to be computed. Once recieved at a fusion center (FC), the tracks then are fused to reconstruct a global estimate. In this lecture, methodologies to a achieve a distributed state estimation are considered. Among these are tracklet fusion, the Bar-Shalom-Campo formula, the Federated Kalman Filter, naive fusion, the distributed Kalman filter and the least squares estimate.				
Soft skills	Mathematical derivation of algorithms, application of mathematical results on estimation theory.				
Contents	tracklet fusion, the Bar-Shalom-Campo formula, the Federated Kalman Filter, naive fusion, the distributed Kalman filter and the least squares estimate, Accumulated State Densities, Decorrlated fusion, product representation				
Prerequisites	**Recommended:** At least 1 of the following: BA-INF 137 – Einführung in die Sensordatenfusion MA-INF 3310 – Introduction to Sensor Data Fusion - Methods and Applications				
Format	**Teaching format**	**Group size**	**h/week**	**Workload[h]**	**CP**
	Lecture	60	2	30 T / 45 S	2.5
	Exercises	30	2	30 T / 75 S	3.5
	T = face-to-face teaching; S = independent study				
Exam achievements	Oral exam (graded)				
Study achievements	Successful exercise participation (not graded)				
Forms of media	Power Point				
Literature	W. Koch: "Tracking and Sensor Data Fusion: Methodological Framework and Selected Applications", Springer, 2014. D. Hall, C.-Y. Chong, J. Llinas, and M. L. II: "Distributed Data Fusion for Network-Centric Operations", CRC Press, 2014.				