Course contents: Mobile Intelligent Systems 2006

	Book / Material	Lecture / Discussion	Exercise
w. 12	**Course description** **Overview** (Chapter 1 – 2) **Basic statistics** (Compendium)	Tuesday 13-15 Course description Chapter 1 - 2 Wednesday, 13-15	
w. 13	**Basic statistics** (Compendium + Chapter 4.2) **GPS** (Chapter 4.1.5.1 + Compendium + paper: Lechner and Baumann 2000) **Kinematics and dead reckoning** (Chapter 3, 5.1-5.2 + paper: Wang 1988)	Tuesday, 13-15 Wednesday, 13-15 Thursday, (15-17)	
w. 14	**Perception** (Chapter 4 + paper: Klang and Baerveldt 1997)	Wednesday, 13-16	**Exercise #1**, GPS, Thursday, (15-17)
w. 15	**Perception** (Chapter 4 + paper: Cox 1991)	Tuesday, 13-16	**Exercise #2**, Kinematics, dead reckoning, error propagation, Wednesday 13-15
w. 17	**Localization and sensor fusion - Kalman filter** (Chapter 5 + paper: Maybeck)	Tuesday, 13-16	**Exercise #3**, Perception, [Cox 1991], Wednesday 13-15
w. 18	**Sensor fusion** (Chapter 5 + paper: Arras *et al*.)	Tuesday, 13-16	**Exercise #4**, Sensor fusion, Kalman filter, Wednesday 13-15
w. 19	**Planning, navigation and obstacle avoidance** (Chapter 6 + papers: Borestein and Koren 1991, Shoval *et al*. 2003)	Tuesday, 13-16	**Exercise**, Extra time, Wednesday 13-15
w. 20	**Applications** (Student presentations of research or commercial products – focus on sensor fusion)	Tuesday, 13-16	

Course parts:

- Written exam, 3 credits, grades: not passed, 3, 4 and 5
- Exercise 1 – 4, which should be followed by a written report, grades: not passed / passed. Reports which are well written and which contain relevant experiments and well explained results (with logical conclusions drawn) favor the final grade of the course in a positive way.
- Oral presentation of a topic chosen by groups of two students. The exercises together with the oral presentation gives 2 credits, grades: not passed / passed
- Exercise 5 is voluntary to do but highly recommended.

People involved:

Course responsibility:

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Course examiner:

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Course web page:

http://www2.hh.se/staff/boola/MobIntSys2006/

Literature:

Siegwart, R.; Nourbakhsh, I. R. Introduction to Autonomous Mobile Robots, The MIT Press, Cambridge, Massachsetts, London, England, ISBN: 0-262-19502-X. Extra materials about mobile robots are available at; http://www.mobilerobots.org

Compendiums covering GPS and basic statistics.

Stencils covering Kalman filters.

Papers:

C. M. Wang, Location Estimation and Uncertainty Analysis for Mobile Robots, *IEEE International Conference on Robotics and Automation*, 24-29 April, 1988, pp. 1231-1235.

W. Lechner and S. Baumann, *Global Navigation Satellite Systems*, *Computers and Electronics in Agriculture*, Volume 25, Issues 1-2, January 2000, Pages 67-85.

A-J. Baerveldt and R. Klang, A Low-cost and Low-weight Attitude Estimation System for an Autonomous Helicopter, *Proceedings of IEEE International Conference on Intelligent Engineering Systems*, 15-17 Sept., 1997, pp. 391-395.

J. Cox, *Blanche - An Experiment in Guidance and Navigation of an Autonomous Robot Vehicle*, *IEEE Transactions on Robotics and Automation*, Volume 7, No. 2, pp. 193-204, April, 1991.

P. S. Maybeck, The Kalman Filter: An Introduction to Concepts, (hard copies) *Autonomous Robot Vehicles*, I. J. Cox and G. T. Wilfong, Eds., New York: Springer-Verlag.

K. O. Arras, N. Tomatis, B. T. Jensen and R. Siegwart, Multisensor On-the-fly Localization: Precision and Reliability for Applications, *Robotics and Autonomous Systems*, pp. 131-143, 2001.

J. Borenstein and Y. Koren, The Vector Field Histogram - Fast Obstacle Avoidance for Mobile Robots, *IEEE Transactions on Robotics and Automation*, Volume 7, No. 3, pp. 278-288, June, 1991.

S. Shoval, I. Ulrich and J. Borenstein, NavBelt and the GuideCane, *IEEE Robotics and Automation Magazine*, Volume 10, Issue 1, pp. 9-20, March, 2003.