Course Schedule, Version 1

Class 1 (Thursday, September 4):
Course overview. Part I: Basics Physical characteristics of mobile wireless ad hoc networks.
Schiller. Mobile Communication, Chapters 1 and 2.
Vaidya. Wireless Networks, Chapters 1 and 2.
Balakrishan. A Graduate Course in Computer Networks, Chapter 4.

Class 2 (Tuesday, September 9):
MAC layer.
Schiller. Mobile Communication, Chapters 3 and 7.
Vaidya. Wireless Networks, Chapters 3, 4, and 5.
Balakrishan. A Graduate Course in Computer Networks, Chapter 11.
Brenner. A technical tutorial on the IEEE 802.11 protocol.
Bharghavan, Demers, Shenker, Zhang. MACAW: A media access protocol for wireless LANs.

Class 3 (Thursday, September 11):
Proposed MAC layers with collision notification. Contention management.
Whitehouse, Woo, et al. Exploiting the capture effect for collision detection and recovery.
Demirbas, Soysal, Hussain. Single hop collaborative feedback primitives for wireless sensor networks.
Gallager. A perspective on multiaccess channels.
Komlos, Greenberg. An asymptotically nonadaptive algorithm for conflict resolution in multiple-access channels.

Homework 1 handed out

Class 4 (Tuesday, September 16):
Time synchronization.

Class 5 (Thursday, September 18):
Time synchronization. Localization.
Fan, Lynch. Gradient clock synchronization.
Lenzen, Locher, Wattenhofer. Clock synchronization with bounded global and local skew
Priyantha, Chakraborty, Balakrishnan. The Cricket location-support system.

Homework 1 due
Homework 2 handed out

Class 6 (Tuesday, September 23):
Localization:
Savvides, Han, Srivastava. Dynamic fine-grained localization in ad-hoc networks of sensors.
Moore, Leonard, Rus, Teller. Robust distributed networks localization with noisy range measurements.
**Class 7** (Thursday, September 25):

- Part II: Communication. Network broadcast.
- Kushelevits, Mansour. An Omega(D log(N/D)) lower bound for broadcast in ratio networks.

**Homework 2 due**

**Homework 3 handed out**

**Class 8** (Tuesday, September 30):

- Point-to-point routing without location information.
- Vaidya, Chapter 6.
- Schiller, Chapter 8.
- Perkins, Royer. Ad hoc on-demand distance-vector routing.
- Chen, Murphy. Enabling disconnected transitive communication in mobile ad hoc networks.

**Class 9** (Thursday, October 2):

- Point-to-point routing without location information: Link-reversal routing algorithms.
- Gafni, Bertsekas. Distributed algorithms for generating loop-free routes in networks with frequently changing topology.
- Park, Corson. A highly adaptive distributed routing algorithm for mobile ad hoc networks.
- Busch, Surapaneni, Tirthapura. Analysis of link reversal routing algorithms for mobile ad hoc networks.

**Homework 3 due**

**Project proposal due**

**Homework 4 handed out**

**Class 10** (Tuesday, October 7):

- Point-to-point routing without location information. Capacity of wireless networks.
- Fang, Gao, Guibas, de Silva, Zhang. GLIDER: Gradient Landmark-based Distributed Routing for Sensor Networks.
- Gupta, Kumar. The capacity of wireless networks.

**Class 11** (Thursday, October 9):

- Location services.
- Awerbuch, Peleg. Concurrent online tracking of mobile users.
- Li, Jannotti, DeCouto, Karger, Morris. A scalable location service for geographic ad hoc routing.
- Abraham, Dolev, Malkhi. LLS: A locality-aware location service for mobile ad hoc networks.

**Homework 4 due**

**Homework 5 handed out**
**Class 12** (Tuesday, October 14):
Location-based routing:
- Ko, Vaidya. Location-aided routing (LAR) in mobile ad hoc networks.
- Barriere, Fraignaud, Narayanan. Robust position-based routing in wireless ad hoc networks with unstable transmission ranges.

**Class 13** (Thursday, October 16):
Part III: Building and maintaining network structures. Topology control.
- Wang, Li. Localized construction of bounded degree and planar spanner for wireless ad hoc networks (DIALM-POMC 2003).

**Homework 5 due**
**Homework 6 handed out**

**Class 14** (Tuesday, October 21):
Clustering 1:
- Kuhn, Wattenhofer. Constant-time distributed dominating set approximation.
- Kuhn, Moscibroda, Wattenhofer. The price of being near-sighted.
- Dubhashi, Mei, Panconesi, Radhakrishnan, Srinivasan. Fast distributed algorithms for (weakly) connected dominating sets and linear-size skeletons.
- Kuhn, Moscibroda. Distributed approximation of capacitated dominating sets.

**Class 15** (Thursday, October 23):
Clustering 2:
- Kuhn, Moscibroda, Wattenhofer. What cannot be computed locally!
- Elkin. Distributed approximations—a survey.
- Awerbuch, Peleg. Sparse partitions.
- Linial and Saks. Decomposing graphs into regions of small diameter.

**Homework 6 due**
**Homework 7 handed out**
Class 16 (Tuesday, October 28):
Unit disk graphs and related models.
Kuhn, Wattenhofer, Zollinger. Ad-hoc networks beyond unit-disk graphs.
Schneider, Wattenhofer. A log-star distributed maximal independent set algorithm for growth bounded graphs.
Linial. Locality in distributed graph algorithms.
Kuhn, Nieberg, Moscibroda, Wattenhofer. Local approximation schemes for ad hoc and sensor networks.
Czygrinow, Hanckowiak. Distributed approximation algorithms in unit-disk graphs.

Class 17 (Thursday, October 30):
Wakeup problem. Local computations in the radio network model.
Gasieniec, Pelc, Peleg. The wakeup problem in synchronous broadcast systems.
Kuhn, Moscibroda, Wattenhofer. Initializing newly deployed ad hoc and sensor networks.

Homework 7 due
Homework 8 handed out

Class 18 (Tuesday, November 4):
Part IV: Middleware. Local infrastructure.
Welsh, Mainland. Programming sensor networks using abstract regions.
Chockler, Demirbas, Gilbert, Newport, Nolte. Consensus and collision detectors in wireless ad hoc networks.
Chockler, Demirbas, Gilbert, Newport. A middleware framework for robust applications in wireless ad hoc networks.

Class 19 (Thursday, November 6):
Middleware: Token circulation, leader election, resource allocation.
Malpani, Welch, Vaidya. Leader election algorithms for mobile ad hoc networks.
Bulgannawar, Vaidya. A distributed k-mutual-exclusion algorithm.
Walter, Cao, Mohanty. A k-mutual-exclusion algorithm for wireless ad hoc networks.

Homework 8 due
Project status report due
Homework 9 handed out

Class 20 (Thursday, November 13):
Middleware: Group communication. Compulsory protocols.
Dolev, Schiller, Welch. Random walk for self-stabilizing group communication in ad hoc networks.
Chatzigiannakis, Nikoletseas, Spirakis. On the average and worst-case efficiency of some new distributed communication and control algorithms for ad-hoc networks.
Chatzigiannakis, Nikoletseas, Spirakis. An efficient communication strategy for ad-hoc mobile networks.
Class 21 (Tuesday, November 18):
Virtual objects. Virtual node layers.
Gilbert. Virtual infrastructure for wireless ad hoc networks (PhD thesis)
Spindel. Simulation and evaluation of the virtual node layer

Class 22 (Thursday, November 20):
Virtual node layers, continued.
Dolev, Gilbert, Lahiani, Lynch, Nolte. Timed virtual stationary automata.

Homework 9 due
Homework 10 handed out

Class 23 (Tuesday, November 25):
Part V: Applications. Data aggregation. Computing properties in mobile networks
Patt-Shamir. A note on efficient aggregate queries in sensor networks.
Kuhn, Locher, Schmid. Distributed computation of the mode.
Aspnes, Ruppert. An introduction to population protocols.
Angluin, Aspnes, Chan, Fischer, Jiang, Peralta. Stably computable properties of network graphs.
Angluin, Aspnes, Fischer, Jiang. Self-stabilizing population protocols.
Angluin, Aspnes, Eisenstat, Ruppert. The computational power of population protocols.

Class 24 (Tuesday, December 2):
Applications: Implementing atomic memory. Robot motion coordination.
Lynch, Shvartsman. RAMBO: A reconfigurable atomic memory service for dynamic networks.
Gilbert, Lynch, Shvartsman, RAMBO II: Rapidly reconfigurable atomic memory for dynamic networks.
Walter, Welch, Amato. Distributed reconfiguration of metamorphic robot chains.
McLurkin. Analysis and implementation of distributed algorithms for multi-robot systems (PhD thesis)

Class 25 (Thursday, December 4):
Robot motion coordination.
Defago, Konagaya. Circle formation for oblivious anonymous mobile robots with no common sense of orientation.
Flocchini, Prencipe, Santoro, Widmayer. Gathering of autonomous mobile robots with limited visibility.
Bullo, Cortes, Martinez. Distributed control of robotic networks.
Lynch, Mitra, Nolte. Motion coordination using virtual nodes.

Homework 10 due
Class 26 (Tuesday, December 9):
   Intelligent highways. Aircraft control.
   Sun, Garcia-Molina. Using ad-hoc inter-vehicle network for regional alerts.
   Kan, Pande, Vinograd, Garcia-Molina, Event Dissemination in High Mobility Ad-hoc Networks.

Final exam time slot  Project presentations