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## 6.885 Course Schedule, Version 3

**Class 1** (Wednesday, February 7): Seth Gilbert

**Course overview. Physical characteristics of mobile wireless ad hoc networks.**  
Schiller. Mobile Communication, Chapters 1 and 2.  
Vaidya's notes on the physical layer.  
Balakrishnan's 6.829 notes, Lecture 11.

**Class 2** (Wednesday, February 15): Nancy Lynch

**MAC layer:** Schiller. Mobile Communication, Chapter 3.  
Vaidya's notes on the MAC layer.  
Gallager. A perspective on multiaccess channels.  
**Homework 1a handed out**

**Class 3** (Tuesday, February 21): Nancy Lynch

**MAC layer:** Komlos, Greenberg. An asymptotically nonadaptive algorithm for conflict resolution in multiple-access channels.  
Brenner. A technical tutorial on the IEEE 802.11 protocol.  
Bharghavan, Demers, Shenker, Zhang. MACAW: A media access protocol for wireless LANs.

**Class 4** (Wednesday, February 22) Nancy Lynch

**Localization:** Savvides, Han, Srivastava. Dynamic fine-grained localization in ad-hoc networks of sensors.  
Priyantha, Chakraborty, Balakrishnan. The Cricket location-support system.  
Priyantha, Balakrishnan, Demaine, Teller. Mobile-assisted localization in wireless sensor networks.  
**Homework 1b handed out**

**Class 5** (Monday, February 27): Nancy Lynch, Tina Nolte

**Localization:** Moore, Leonard, Rus, Teller. Robust distributed networks localization with noisy range measurements.  
Aspnes, Eren, Goldenberg, Morse, Whiteley, Yang, Anderson, Belhumeur. A theory of network localization.

**Class 6** (Wednesday, March 1): Tina Nolte, Rui Fan

**Localization:** Aspnes, Eren, Goldenberg, Morse, Whiteley, Yang, Anderson, Belhumeur. A theory of network localization.  
**Time synchronization:** Elson, Girod, Estrin. Fine-grained network time synchronization using reference broadcasts.  
**Homework 1 due**  
**Homework 2a handed out**

**Class 7** (Monday, March 6): Rui Fan

**Time synchronization:** Karp, Elson, Papadimitriou, Shenker. Global synchronization in sensornets.  
Su, Akyildiz. Time-diffusion synchronization protocol for wireless sensor networks.  
Fan, Lynch. Gradient clock synchronization.

**Class 8** (Wednesday, March 8): Rui Fan, Paulina Varshavskaya

**Time synchronization:** Attiya, Hay, Welch. Optimal clock synchronization under energy constraints in wireless ad hoc networks.  
**Topology control:** Li, Halpern, Bahl, Wang, Wattenhofer. Analysis of a cone-based distributed topology control algorithm for wireless multi-hop networks.

Bahramgiri, Hajiaghayi, Mirrokni. Fault-tolerant and three-dimensional distributed topology control algorithms in wireless multi-hop networks.

**Homework 2b handed out**

**Class 9** (Monday, March 13): Seth Gilbert

**Local infrastructure:** Chockler, Demirbas, Gilbert, Newport, Nolte. Consensus and collisions detectors in wireless ad hoc networks.

**Class 10** (Wednesday, March 15): Nancy Lynch

**Network broadcast:** Bar-Yehuda, Goldreich, Itai. On the time complexity of broadcast in multi-hop radio networks: An exponential gap between determinism and randomization.

**Homework 2 due**

**Homework 3a handed out**

**Class 11** (Monday, March 20): Tom Wilson, Nancy Lynch

**Broadcast:** Bar-Yehuda, Goldreich, Itai. An efficient emulation of single-hop radio network with collision detection on multi-hop radio network with no collision detection.

Kowalski, Pelc. A time of deterministic broadcasting in radio networks with local knowledge.

**Class 12** (Wednesday, March 22): Nancy Lynch, Martijn Stevenson

**Broadcast:** Kushelevits, Mansour. An  $\Omega(D \log(N/D))$  lower bound for broadcast in radio networks.

Livadas, Lynch. A reliable broadcast scheme for sensor networks.

**Point-to-point routing:** Karp. Slides on routing in mobile networks.

Johnson, Maltz. Dynamic source routing in ad hoc wireless networks.

Hu, Johnson. Caching strategies in on-demand routing protocols for wireless ad-hoc networks.

**Homework 3b handed out**

Monday, March 27 and Wednesday, March 29 Spring break, no classes.

**Class 13** (Monday, April 3): Calvin Newport, Nancy Lynch

**Point-to-point routing—basic algorithms:** Perkins, Royer. Ad hoc on-demand distance-vector routing.

Chen, Murphy. Enabling disconnected transitive communication in mobile ad hoc networks.

**Link-reversal algorithms:** Gafni, Bertsekas. Distributed algorithms for generating loop-free routes in networks with frequently changing topology.

Busch, Surapaneni, Tirthapura. Analysis of link reversal routing algorithms for mobile ad hoc networks.

**Class 14** (Wednesday, April 5): Calvin Newport, Nancy Lynch

**Link-reversal algorithms:** Gafni, Bertsekas and Busch, Surapaneni, Tirthapura, cont'd.

Park, Corson. A highly adaptive distributed routing algorithm for mobile ad hoc networks.

**Point-to-point routing: Location-free routing:** Rao, Papadimitriou, Shenker, Stoica. Geographical routing without location information.

Fonseca, Ratsanamy, Zhao, Ee, Culler, Shenker, Stoica. Beacon Vector Routing: Scalable Point-to-point routing in wireless sensor networks.

Fang, Gao, Guibas, de Silva, Zhang. GLIDER: Gradient Landmark-based Distributed Routing for Sensor Networks.

**Homework 3 due**

**Homework 4a handed out**

**Class 15** (Monday, April 10) Javier Velez, Pol Ypodimatopoulos, Nancy Lynch

**Location-based routing:**

Ko, Vaidya. Geocasting in mobile ad-hoc networks: location-based multicast algorithms.

Ko, Vaidya. Location-aided routing (LAR) in mobile ad hoc networks.

Kranakis, Singh, Urrutia. Compass routing on geometric networks.

Bose, Morin, Stojmenovic, Urrutia. Routing with guaranteed delivery in ad hoc wireless networks.

**Class 16** (Wednesday, April 12): Javier Velez, Pol Ypodimatopoulos, Nancy Lynch

**Location-based routing:** Karp, Kung. GPSR: Greedy perimeter stateless routing for wireless networks.

Barriere, Fraignaud, Narayanan. Robust position-based routing in wireless ad hoc networks with unstable transmission ranges.

**Homework 4b handed out**

Monday, April 17 Patriot's Day, no class.

**Class 17** (Wednesday, April 19): Pol Ypodimatopoulos, Rui Fan, Nancy Lynch

**Location-based routing:** Kuhn, Wattenhofer, Zhang, Zollinger. Geometric ad hoc routing: Of theory and practice.

**Global infrastructure:** Elkin. Distributed approximations—a survey.

Kuhn, Wattenhofer. Constant-time distributed dominating set approximation.

Kuhn, Moscibroda, Wattenhofer. What cannot be computed locally!

**Homework 4 due**

**Homework 5a handed out**

**Class 18** (Monday, April 24): Nancy Lynch

**Location services:** Awerbuch, Peleg. Concurrent online tracking of mobile users.

Jannotti, DeCouto, Karger, Morris. A scalable location service for geographic ad hoc routing.

**Class 19** (Wednesday, April 26): William Tetteh, Tina Nolte, Nancy Lynch

**Location services:** Abraham, Dolev, Malkhi. LLS: A locality-aware location service for mobile ad hoc networks.

Demirbas, Nolte, Arora, Lynch. Stalk: A self-stabilizing hierarchical tracking service for sensor networks.

**Clustering:** Mittal, Demirbas, Arora. Local clustering in large-scale wireless networks.

**Middleware services: Link-reversal algorithms:** Walter, Welch, Vaidya. A mutual exclusion algorithm for ad hoc mobile networks.

**Homework 5b handed out**

**Class 20** (Monday, May 1): Nancy Lynch, Grace Woo, Alfred Ng

**Middleware services: Link-reversal algorithms:** Walter, Welch, Vaidya, cont'd.

Walter, Cao, Mohanty. A  $k$ -mutual-exclusion algorithm for wireless ad hoc networks.

Malpani, Welch, Vaidya. Leader election algorithms for mobile ad hoc networks.

**Middleware services: Token-circulation algorithms:** Malpani, Chen, Vaidya, Welch. Distributed token circulation in mobile ad hoc networks.

Chen, Welch. Self-stabilizing dynamic mutual exclusion for mobile ad hoc networks.

Dolev, Schiller, Welch. Random walk for self-stabilizing group communication in ad hoc networks.

**Class 21** (Wednesday, May 3): Seth Gilbert, Brian Wu, Nancy Lynch

**Virtual objects:** Dolev, Gilbert, Lynch, Shvartsman, Welch. GeoQuorums: Implementing atomic memory in ad hoc networks.

**Compulsory protocols:** Hatzis, Pentaris, Spirakis, Tampakas, Tan. Fundamental control algorithms in mobile networks.

Chatzigiannakis, Nikolettseas, Spirakis. An efficient routing protocol for hierarchical ad-hoc mobile networks.

Chatzigiannakis, Nikolettseas, Spirakis. An efficient communication strategy for ad-hoc mobile networks.

Chatzigiannakis, Nikolettseas, Spirakis. On the average and worst-case efficiency of some new distributed communication and control algorithms for ad-hoc networks.

**Homework 5 due**

**Homework 6a handed out**

**Class 22** (Monday, May 8): Seth Gilbert, Tina Nolte

**Virtual mobile nodes:** Dolev, Gilbert, Lynch, Schiller, Shvartsman, Welch. Virtual mobile Nodes

for nobile ad hoc networks.

**Virtual stationary nodes:** Dolev, Gilbert, Lahiani, Lynch, Nolte. Timed virtual stationary automata.

Dolev, Lahiani, Lynch, Nolte. Self-stabilizing mobile node location management and message routing.  
Chockler, Gilbert. Replicated state machines for collision-prone wireless networks.

**Class 23** (Wednesday, May 10): Jim Aspnes

**Applications: Data aggregation:**

Shrivastava, Buragohain, Agrawal, Suri. Medians and beyond: New aggregation techniques for sensor networks.

Nath, Gibbons, Anderson, Seshan. Synopsis diffusion for robust aggregation in sensor networks.

Patt-Shamir. A note on efficient aggregate queries in sensor networks.

Angluin, Aspnes, Diamadi, Fischer, Peralta. Computation in networks of passively mobile finite-state sensors.

Angluin, Aspnes, Chan, Fischer, Jiang, Peralta. Stably computable properties of network graphs.

**Homework 6b handed out**

**Class 24** (Monday, May 15): Seth Gilbert, James McLurkin

**Applications: Implementing atomic memory:** Lynch, Shvartsman. RAMBO: A reconfigurable atomic memory service for dynamic networks.

Gilbert, Lynch, Shvartsman, RAMBO II: Rapidly reconfigurable atomic memory for dynamic networks.

Dolev, Gilbert, Lynch, Shvartsman, Welch. GeoQuorums: Implementing atomic memory in ad hoc networks.

**Robot motion planning:** Li, Rus. Navigation protocols in sensor networks.

**Routing, revisited:** Woo, Tong, Culler. Taming the underlying challenges of reliable multihop routing in sensor networks.

**Class 25** (Wednesday, May 17): Shinya Umeno, Rachid Guerraoui

**Applications: Robot motion control:** Walter, Welch, Amato. Distributed reconfiguration of metamorphic robot chains.

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.

Lynch, Mitra, Nolte. Motion coordination using virtual nodes.

**Intelligent highways:**

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.

**Air-traffic management:** TBA

**Homework 6 due**