Tentative Course Schedule

Lecture 1 (Thursday, Sept. 9) Course overview. Synchronous networks. Leader election in ring networks and in general networks.
Homework 1a out.

Lecture 2 (Tuesday, Sept. 14) Computation in general synchronous networks. Breadth-first search. Shortest paths. Broadcast and convergecast. Minimum spanning tree.

Lecture 3 (Thursday, Sept. 16) Fault-tolerant consensus problems. Link failures: the Two Generals problem. Process failures (stopping, Byzantine). Algorithms for stopping agreement and Byzantine agreement. Exponential information gathering.
Homework 1b out.

Lecture 4 (Tuesday, Sept. 21) Processor bounds for consensus problems. Weak Byzantine agreement. Time bounds for consensus problems.

Lecture 5 (Thursday, Sept. 23) k-agreement. Approximate agreement. Commit.
Homework 1 due; Homework 2a out.

Lecture 6 (Tuesday, Sept. 28) Asynchronous shared memory systems. Mutual exclusion algorithms.

Lecture 7 (Thursday, Sept. 30) Mutual exclusion algorithms, cont'd.
Homework 2b out.

Lecture 8 (Tuesday, Oct. 5) Bound on shared read/write variables for mutual exclusion. Resource allocation. Dining Philosophers.

Lecture 9 (Thursday, Oct. 7) Impossibility of consensus in asynchronous shared memory systems (FLP). k-agreement.
Homework 2 due. Homework 3a out.

Lecture 10 (Tuesday, Oct. 12) I/O automata. Modeling and proofs.

Lecture 11 (Thursday, Oct. 14) Atomic objects.
Homework 3b out.

Lecture 12 (Tuesday, Oct. 19) Atomic snapshot algorithms. Atomic read/write register algorithms.

Lecture 13 (Thursday, Oct. 21) Asynchronous message-passing systems. Leader election. Breadth-first search, shortest paths. Broadcast and convergecast. Minimum spanning tree.
Homework 3 due; Homework 4a out.

Lecture 14 (Tuesday, Oct. 26) Synchronizers. Synchronizer applications. Synchronous vs. asynchronous distributed systems.

Lecture 15 (Thursday, Oct. 28) Translations between asynchronous network model and asynchronous shared memory model. Impossibility of consensus in asynchronous networks. Reducibilities for problems in asynchronous networks.
Proposals for class projects due. Homework 4b out.

Lecture 16 (Tuesday, Nov. 2) Failure detectors. Consensus, commit and broadcast.

Lecture 17 (Thursday, Nov. 4) Time, clocks, ordering of events. State-machine simulation. Applications.
Homework 4 due. Homework 5a out.

Lecture 18 (Tuesday, Nov. 9) Distributed termination. Global snapshots. Stable property detection. Deadlock detection.
Homework 5b out.

Veteran's Day Holiday (Thursday, Nov. 11)

Lecture 19 (Tuesday, Nov. 16) Communication. Data link protocols.

Lecture 20 (Thursday, Nov. 18) Data link protocols, cont'd.
Homework 5 due. Homework 6a out.

Lecture 21 (Tuesday, Nov. 23) Timing-based systems. Modelling and verification. Mutual exclusion. Consensus.
Homework 6b out.

Thanksgiving Holiday (Thursday, Nov. 25)

Lecture 22 (Tuesday, Nov. 30) Reliable distributed computing. Group membership services. View-oriented group communication services. State transfer between views. Applications: Short-term and long-term data consistency, highly available servers, resource allocation. Service specifications.

Lecture 23 (Thursday, Dec. 2) Service specifications, cont'd: Static universe view services. Dynamic universe view and configuration services. Services with transitional views. Applications using the specs: Highly available servers. Totally ordered broadcast.
Homework 6 due.

Lecture 24 (Tuesday, Dec. 7) Applications using the specs, cont'd: Long-term data consistency. Consensus. Resource allocation.

Lecture 25 (Thursday, Dec. 9) Implementations of group communication services: Static services. Dynamic services. Transitional views.
Project reports due.

Optional Meeting 26 (Friday, Dec. 10, 9-1) Student project presentations.