

Distributed Systems

Instructor: Dr. Vijay Garg

Course Description: Programming experience, Graduate standing. This will be an introductory graduate level course in distributed systems. It will expose students to theoretical as well as practical aspects of designing such systems. The course assumes that the student has some familiarity with programming. There is no final exam but there will be two exams during the course.

Syllabus: The following topics will be covered in the course:

- *Models of Distributed Computation:* Happened before relation, posets, lattices
- *Time:* Logical clocks, vector clocks, direct dependency clocks, matrix clocks.
- *Resource Allocation:* Mutual Exclusion, Drinking Philosophers, Election
- *Global Property Evaluation:* Chandy and Lamport's algorithm, termination detection, unstable properties.
- *Ordering of Messages:* causal, synchronous, multi-cast protocols.
- *Global Computation:* Diffusing computation, supervised computation.
- *Consensus:* FLP Result, Synchronous systems, Byzantine Agreement
- *Fault-tolerance:* Failure Detectors, Checkpointing, optimistic and pessimistic recovery, Self-stabilizing algorithms.

Grading: 25 % Assignments, 25 % Exam 1 (in-class), 20% Term paper, 5% Class presentation 25 % Exam 2.

Textbook :

Elements of Distributed Computing by Vijay K. Garg, Wiley & Sons, 2002.