

ECE 750 - Real-Time Computing Systems

COURSE OUTLINE

1. Introduction to Real-Time Systems (0.5 week)
 - distinguishing characteristics of real-time applications
 - notions of guarantee
2. Uniprocessor Scheduling (2.5 weeks)
 - Rate monotonic and Earliest Deadline First algorithms
 - Deferrable server, Sporadic server, Total Bandwidth Server
 - Chetto & Chetto and slack stealing
3. Resource management (1.5 weeks)
 - Priority inheritance and priority ceiling
 - Stack resource protocol
4. Multiprocessor/Multi-core scheduling (2 weeks)
 - Hard deadline guarantees
 - Bidding, focussed addressing, load sharing
 - Resource reclaiming
5. Time-constrained communication (1 week)
 - multiple access networks
 - point-to-point networks
6. Fault-tolerance (1 week)
 - Fault models: fail-stop, omission, timing, Byzantine
 - Interactive consistency: exact and approximate agreements
 - Clock synchronization
7. Real-time kernels (1 week)
 - Real-time Unix
 - Spring Kernel
 - RT-MACH

8. Timing analysis and verification (1 week)

- WCET
- Cache management
- Pipelining

9. Applications (2 weeks)

- Real-time control
- Transaction processing
- Multimedia