COMP 5416 Exam Study Notes

-- The end of the course
Notes

- These slides are presented on a week by week coverage of topics in the unit.
- “Concepts” basically means meaning of terms, ideas behind terms, principles, understanding of processes.
Week 1 -- Probability

- Experiment, outcome, sample space, event, probability
- Basic probability laws
- Conditional probability
- Random variables
- The Poisson distribution
- The exponential distribution
- No direct questions. Knowledge introduced here may be needed for other questions as background.
Week 2 – Generating Random Variables

- Pseudo-random numbers
- Methods to generate Pseudo-Random numbers
  - The congruential generators
- Inverse method
- Table method
Week 2 -- Simulation

- Discrete event-driven simulation
- Implementation Details
  - Event list, system state, simulation clock
  - Inputs
  - Outputs
  - Length of simulation
Week 3 -- Asynchronous Transfer Mode

- The concepts of synchronous Transfer mode and asynchronous transfer mode
- ATM architecture and user planes
- Virtual path, virtual channel, physical transmission path
- No header format is required
- No AAL type is required
Week 3 – High Speed LAN

- **CSMA/CD**
  1. If the medium is idle, transmit.
  
  2. If the medium is busy, continue to listen until the channel is idle, then transmit immediately.
  
  3. If a collision is detected during transmission, immediately cease transmitting.
  
  4. After a collision, wait a random amount of time, then attempt to transmit again (repeat from step 1).

- No medium options, Layer 2 switch of traditional LAN are tested
- Wireless LAN, 802.11 series
Week 4 -- Queueing Theory

- The ideas of queueing
- Little’s Law
- Modeling queuing system
- Kendall notation
- M/M/1 Queue
  - Occupancy
  - Mean number
  - Mean delay
  - Mean waiting time
Week 4 – Queueing Theory (Cont.)

- $\text{M/M/1/n}$
  - Occupancy
  - Mean number
  - Mean delay
  - Mean waiting time

- $\text{M/M/2}$

- $\text{M/M/}\infty$
Week 5 – Congestion Control

- Network performance metrics
  - Throughput
  - Delay
  - Power
- Congestion Control Approaches
  - Backpressure
  - Implicit congestion signaling
- Explicit congestion signaling
Week 6 -- Link-level Flow and Error Control

- The idea of flow control
- The idea of error control
- Flow control
  - Stop and wait
  - Sliding window
  - Go-back-N ARQ
  - Selective-reject ARQ
  - Their performance analysis
- No TCP flow control is required
Week 7 -- Integrated and Differentiated Services

- The ideas of IntServ and DiffServ
- Elastic and inelastic traffic
- Queuing principle
  - FIFO
  - Fair queuing
  - Processor sharing
  - Bit-round fair queuing
  - Generalised processor sharing
  - Weighted fair queueing
- Active queue Management (AQM) and Random Early Detection (RED)
Week 9 -- VoIP

- VoIP components
- VoIP classification
- Codecs
- Delay
- Packet Loss
- SIP and SIP protocol details
Week 10 – Wireless Sensor Network

- Sensor Node Structure
- WSN architecture
- Classification of WSN
- Protocol stacks of WSN
- Why need energy efficiency in WSN
- Network lifetime
- Power conservation methods
Week 11 – The Continuation of Wireless Sensor Network

- The idea of task scheduling in WSN
- DAG
- Node levels
- Start time
- List scheduling
Exam Related Tips

- No what is what questions
- No programming questions
- Calculation only uses basic mathematical operators.
- A ruler might be very helpful for you to solve the questions.
- Consultation time is arranged as following:
  - 7. Nov. Wed. 10AM – 5PM
  - 12, 13, 14 Nov. 10AM – 5PM