Class 5

Modelling a Service Station (I): Empirical/Deterministic Models; Fluid/Flow Models/Approximations of Predictable Queues

- Introduction:
  - Legitimate models: Simple, General, Useful
  - Approximations (strong)
  - Tools

- Scenario analysis
  - vs. Simulation, Averaging, Steady-State
  - Typical scenario, or very atypical (eg. ”catastrophy”)

- Predictable Variability
  - Averaging scenarios, with small “CV”
  - A puzzle (the human factor ⇒ state dependent parameters)
  - Sample size required increases with CV
  - Predictable variability could also turn unpredictable

- Hall: Chapter 2 (discrete events);

- 4 Pictures:
  - Cummulants
  - Rates (⇒ Peak Load)
  - Queues (⇒ Congestion)
  - Outflows (⇒ end of rush-hour)

- Phases of Congestion: under-, over- and critical-loading
- Scales (Transportation, Telephone (1976, 1993, 1999))
- Simple Important Models: EOQ, Aggregate Planning
- Queues with Abandonment and Retrials (=Call Centers; Time- and State-dependent Q’s).
- Bottleneck analysis in a (feed-forward) Fluid Network, via National Cranberry

- Addendum
  - (Skorohod’s Deterministic Fluid Model (of a service station): teaching note)

Recitation 5: Fluid models, with application to staffing.

HW 5: “Fluid Models”.