# ECE 642 – Fall 2006
# Formula List

**Norton's algorithm**

$$\gamma = \sum_{n=1}^{N} u(n)p_n$$

$$E(T) = \frac{E(n)}{\gamma} = \frac{\sum_{n=1}^{N} np_n}{\gamma}$$

when $\lambda \gg \mu (\lambda \to \infty)$

$$\gamma = \frac{N\mu}{N + (M-1)}$$

$$E(T) = \frac{N + (M-1)}{\mu}$$

**Buzen's algorithm**

1. $g(n, m) = g(n, m-1) + \rho_m g(n-1, m)$ with $\rho_m = \frac{\lambda_m}{\mu_m}$ where $m = 1, 2, \ldots M$.
2. The initial condition is define as follows:

$$g(n, 1) = \rho_1^n$$

where $n = 0, 1, 2, \ldots N$, and

$$g(0, m) = 1$$

where $m = 1, 2 \ldots M$.

$$P(n_i \geq k) = \rho_i^k \frac{g(N-k, M)}{g(N, M)}$$

$$P(n_i = k) = \frac{\rho_i^k}{g(N, M)} [g(N-k, M) - \rho_i g(N-k-1, M)]$$

For each VC, the expected number of packets is:

$$E(n_i) = \sum_{k=1}^{N} \rho_i^k \left[ \frac{g(N-k, M)}{g(N, M)} \right]$$

The normalized throughput is:

$$\frac{\gamma_i}{\mu_i} = \rho_i \left[ \frac{g(N-1, M)}{g(N, M)} \right]$$

**Mean Value Analysis**

1. Set $\overline{n_i}(0) = 0$ for $\forall i \epsilon [1, M]$.

2. Set $\mu_i \overline{t_i}(N) = 1 + \overline{n_i}(N-1)$ for $\forall i \epsilon [1, M]$.

3. $\gamma(N) = \frac{N}{\sum_{i=1}^{M} \overline{t_i}(N)}$

4. $\overline{n_i}(N) = \gamma(N) \overline{t_i}(N)$