

**NE 150 - Introduction to Nuclear Reactor Theory  
Spring 2007**

**Learned from Chapter 2**

1. How to construct differential balance equations

Components of the balance equation:

Fission source (energy dependent)

Scattering source (energy dependent)

Derivation of the Boltzmann equation

One-group  $P_1$  equations in slab geometry

Relation of Fick's Law to the  $P_1$  equations

Derivation of diffusion equation (eq. 2.28)

Derivation of the one-group diffusion equation (eq. 2.40)

Derivation of two-group diffusion equation from E-dependent equation (eq. 2.48)

2. Integral transport equation

Qualitative idea of derivation

3. Interface and boundary conditions

For the Boltzmann equation, interface and vacuum boundary conditions

Extrapolation length as boundary condition.

4. Operator Notation and the Fundamental Neutronics problems

Definition of Fission and Migration/Loss Operators

The mathematical and physical definition of the eigenvalue problem

5. Estimates of Criticality (Sec 2.5) Read Not Study

6. Do Not Read / Study Secs 2.6/2.7