

NUCLEAR SYSTEMS ENGINEERING

Cho, Hyoung Kyu

*Department of Nuclear Engineering
Seoul National University*

0. COURSE DESCRIPTION

❖ Objectives of Course

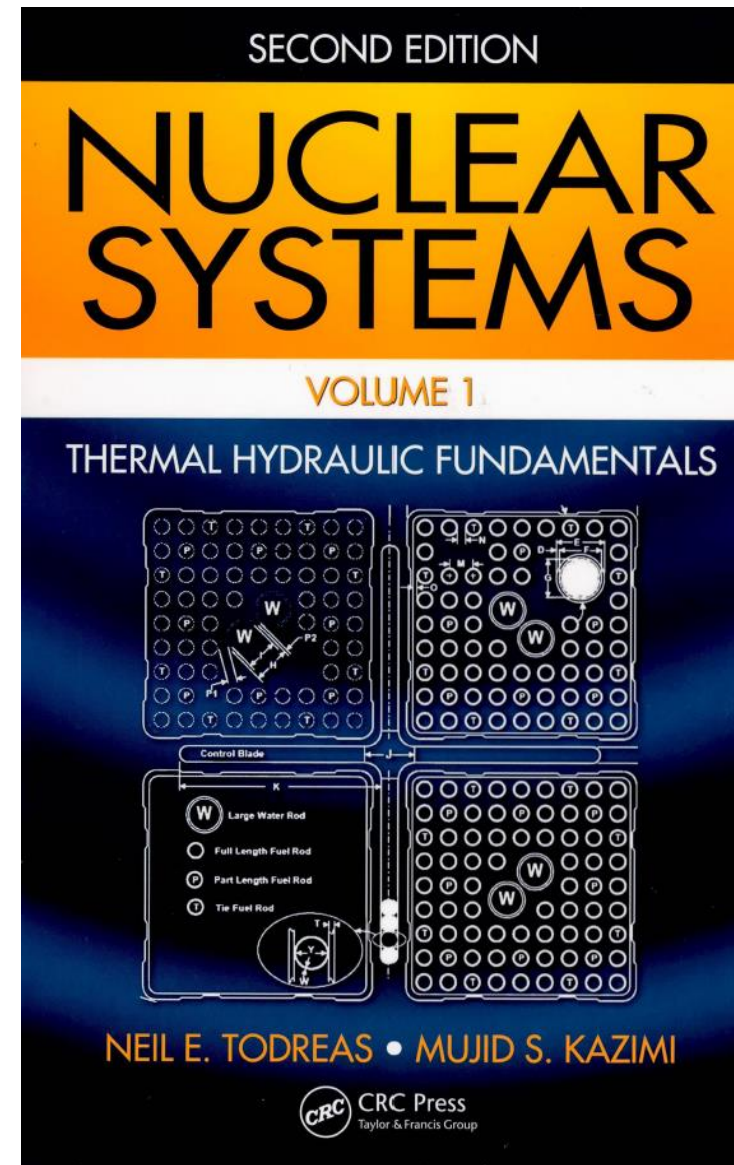
- Introduce various nuclear power plant systems with their components
 - Mainly for pressurized water reactors of Korea
 - OPR1000, APR1400, EU-APR, APR+, IPOWER
 - CANDU, BWR, VHTR, SMR, SFR etc.
- Provide analysis methods for the system behaviors.
 - Thermo-dynamics
 - Heat transport

❖ Grading Policy

- Homework (50%)
- Mid-term exam. (25%)
- Final exam (25%)

❖ Main textbook

- Nuclear Systems Vol. 1
 - Written by N. E. Todreas and M. S. Kazimi
 - 2nd edition published in 2012
- Lecture note



❖ Contents of the textbook

- Chapter 1 Principal Characteristics of Power Reactors
- Chapter 2 Thermal Design Principles and Application
- Chapter 3 Reactor Energy Distribution
- Chapter 4 Transport Equations for Single-Phase Flow
- Chapter 5 Transport Equations for Two-Phase Flow
- Chapter 6 Thermodynamics of Nuclear Energy Conversion Systems:
Nonflow and Steady Flow : First- and Second-Law Applications
- Chapter 7 Thermodynamics of Nuclear Energy Conversion Systems :
Nonsteady Flow First Law Analysis
- Chapter 8 Thermal Analysis of Fuel Elements
- Chapter 9 Single-Phase Fluid Mechanics
- Chapter 10 Single-Phase Heat Transfer
- Chapter 11 Two-Phase Flow Dynamics
- Chapter 12 Pool Boiling
- Chapter 13 Flow Boiling
- Chapter 14 Single Heated Channel: Steady-State Analysis

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[Topics in Nuclear Heat Transport](#)
by Prof. E.S. Kim

Contents of Lecture

❖ Contents of lecture

- Chapter 1 Principal Characteristics of Power Reactors

- Will be replaced by the lecture note
- Introduction to Nuclear Systems

Nuclear system

- Chapter 4 Transport Equations for Single-Phase Flow (up to energy equation)

- Chapter 6 Thermodynamics of Nuclear Energy Conversion Systems:

Nonflow and Steady Flow : First- and Second-Law Applications

- Chapter 7 Thermodynamics of Nuclear Energy Conversion Systems :

Nonsteady Flow First Law Analysis

Thermodynamics

- Chapter 3 Reactor Energy Distribution

- Chapter 8 Thermal Analysis of Fuel Elements

Heat transport
Conduction
heat transfer