CITY COLLEGE OF NEW YORK

ENGR 55500/G5300 –REACTOR THERMAL HYDRAULICS

COURSE SYLLABUS – 2024 Spring

Instructor: Prof. M. Kawaji (ST-249)
Tel: 212-650-8584, E-mail: ENGR55500@gmail.com

Hybrid Course: All lectures and exams will be given in person.

Pre-requisite: ME 35600 Fluid Mechanics or equivalent
Co-requisite: ME 43300 Heat Transfer or equivalent

TOPICS

- Introduction: Nuclear reactor cooling systems, major components including fuel channels, steam generators, turbines, condensers, cooling towers
- Heat generation in fuel elements, conduction and convection heat transfer
- Single-phase fluid flow, conservation equations, flows in piping systems, extended Bernoulli equation, pumps, major and minor friction losses
- Phase change heat transfer, boiling and condensation, Critical Heat flux,
- Two-phase flow: void fraction variation and pressure drop
- Measurement techniques: temperature, pressure, pressure drop and void fraction
- Analysis of reactor pump performance
- Thermal-hydraulics aspects of reactor safety: Loss of Coolant Accidents, countercurrent flooding, TMI accident

Lecture hours:	Monday	5:00 pm – 7:50 pm	
Office hours:	Thursday	2:00 pm – 4:00 pm	in person or by Zoom Meeting ID: 2126508584 Passcode: 878938

Mark Distribution:

Final Examination	45 %
Midterm Exam	25 %
Assignments	20 %
Design Project	10 %

Note: Only the lecture notes and handouts will be allowed in Midterm and Final Exams. Assignment solutions will not be allowed.

Textbooks (Recommended):

Todreas and Kazimi, Nuclear Systems - Volume I: Thermal Hydraulic Fundamentals, 2nd ed., Taylor & Francis, 1989.

El-Wakil, Nuclear Heat Transport, American Nuclear Society, 1981.

Glasstone and Sesonske, Nuclear Reactor Engineering, Van Nostrand Reinhold, 3rd Ed., 1981.

NUCLEAR ENGINEERING CONCENTRATION

For Undergraduate students

- Consists of three courses with 3 credits each.
    - ENGR55600 Reactor Design, Operation and Safety (Fall, 2024)
    - ENGR55400 Reactor Physics and Engineering (Spring, 2025)
    - ENGR55500 Reactor Thermal Hydraulics (Fall, 2025)
- Given a Certificate upon completion of all three courses.

For Master's Students

- Two Nuclear Engineering courses listed above can be taken for 2 x 3 = 6 credits for a Master's degree.

For PhD students

- No credits can be earned for a PhD degree.