

## NUCL 610 Nuclear Reactor Theory II

1. 3 Credit Hours
2. **Instructor(s):** Yunlin Xu
3. **Textbook(s):**  
No textbook
4. **Course Description**

Advance Methods for solving multigroup diffusion and transport equations will be discussed. The methods include finite difference and nodal method for diffusion theory, Sn, Pn, CPM and MOC for transport theory, Monte Carlo method and Transient simulation will be also discussed. The course will be project based. Students will learn to developed codes with the methods discussed in this course. There will be 5 group projects,

1. Develop finite difference and nodal expansion method codes for 1D diffusion theory
2. Develop Pn and Sn codes for 1D transport theory
3. Develop MOC and CPM codes to solve 2D transport theory
4. Simulate nuclear reactor with Monte-Carlo codes
5. Transient analysis with spatial kinetics code.

5. **Pre-requisite:** NUCL 510

6. **Classification:** Required?

7. **Learning Objectives**

- a. To understand deterministic and statistic methods for solving neutron transport and diffusion equations.
- b. To apply theory methods in code implementation.
- c. To solve neutron

8. **ABET Student Outcomes**

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
3. An ability to communicate effectively with a range of audiences.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

**9. Grades Policies:**

Projects: There will 5 projects, 80% of total score

Attendance and Participation: 20% of total score

Guaranteed floors for letter grade

F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A+
60	63	66	70	73	76	80	83	86	90	93	

No curve with percentage

Possible Adjustments:

Whole class adjustment if there are unreasonable requirements in projects

Minor adjustment ( $\leq 5$  points) for students who made significant effort and improvement for the course

Projects are due on class, can be submitted earlier. Late submissions will have 5% per day reduction in score, and not accepted after a week from due day.

Regrade requests must be submitted with a written justification within a week after grade released to students.