NUCL350: NUCLEAR THERMAL-HYDRAULICS I
Fall 2025, Mon, Wed, Fri: 10:30pm-11:20pm, LWSN B155

Course Description: 3 cr. hrs. The first of an integrated two-course sequence introducing the concepts of nuclear reactor thermal transport and associated hydraulics with applications to design and safety.

Course Objectives: To provide Nuclear Engineering students with sufficient background to (a) basic concepts in fluid kinematics and dynamics, (b) macroscopic formulation for balances of mass, momentum and energy of fluid flow, (c) integral and differential analysis of fluid flow, (d) applications of fluid equations to practical systems including nuclear power reactor, (d) fundamentals of Navier-Stokes equations, and (e) basic concepts on two-phase flow.

Prerequisites: ME200, ME274

Instructor: Dr. Seungjin Kim, LMBS 5281P
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Office Hours: By appointment

Teaching Assistant: Preston James Kilzer pkilzer@purdue.edu Alicja Stoppel astoppel@purdue.edu
Office Hour: Wednesday from 1:00-3:00 PM @ LMBS5230

Textbook (Optional): Cengel, Y., and Cimbala, J. M., *Fluid Mechanics: Fundamentals and Applications*, McGraw-Hill.

References:

- Fox and McDonald, *Introduction to Fluid Mechanics*, J. Wiley & Sons Inc.
- Munson, B., Young, D., and Okiishi, T., *Fundamentals of Fluid Mechanics,* J. Wiley & Sons, Inc.
- White, F., *Fluid Mechanics,* McGraw Hill
- Van Dyke, M., *An Album of Fluid Motion* (ISBN #: 0-915760-02-9)
- N. E. Todreas and M. S. Kazimi, Nuclear Systems Vol I, CRC Press.

Policies:

- Course policies will be strictly observed as part of maintaining integrity of the course.
- Attendance is mandatory. Students who miss classes are expected to be responsible for material discussed during the missed lectures.
- Practice Problems:
  - Practice problems are provided to enhance learning, and students are expected to work on the practice problems with diligence.
  - No grading on the practice problems will be performed, but solutions for the problems will be made available to students one week from the day assigned. It is the student's responsibility to check his/her work with the solution for accuracy.
  - A student can earn a total of up to extra 3% points (in 100% scale) by submitting all of his/her work in '*acceptable*' form.
  - For the work to be considered 'acceptable'; one must (a) prepare neatly organized handwritten solutions (unless instructed otherwise) showing logical and detailed working steps, (b) must present work for ALL the problems listed in the given problem set, and (c) submit the work within one week from the day assigned by 5pm of the due day. The completed work needs to be submitted in PDF file via the course BrightSpace with the following file name: LastName,FirstInitial_PracticeProblem# (e.g., Kim,S_01). No other formats will be considered for extra points.

- Healthy collaboration/discussion on the practice problems are not only allowed but encouraged, as it can enhance learning. Up to THREE (3) people is allowed for collaboration. If there were collaborators in working on the problems, list the names of all collaborators in the cover page. Each student will need to submit his/her work individually to earn credit.
- No late submission will be accepted.

- Quizzes:
  - Quizzes will be given without prior notice during the class period.
  - No make-up quizzes will be given.
  - TWO (2) quizzes with lowest scores will be dropped in calculating the final score.
- Exams:
  - FOUR exams will be given (3 midterm & 1 final exams).
  - No make-up exam will be allowed.
  - If a student is in need of a special accommodation due to disability, arrangement needs to be made through Purdue Disability Resource Center as early as possible or TWO (2) weeks prior to the scheduled exam date at the latest.
  - Three best exam scores (out of four) will be used in calculating the final exam grade.
  - A student who earns an A grade after the third exam (accounting for the quizzes, three exams, and any other extra credits) may opt out of the Final Exam with an A grade. Otherwise, students MUST take all four exams.
  - Important Note*:* If a student does not show up in the final exam (without opting out with an A grade) or shows up but submit an exam solution with a score of less than 50%, ALL four exam scores will be used in calculating the final grade.
- Extra Credit Opportunities
  - Project: A project assignment may be given worth extra 2% points each.
  - Special events & seminars: Attendance in pre-approved special events and/or seminars will be accounted for extra 0.5% point each.
- Course Materials including solutions for practice problems are intended for personal use only by authenticated users who are enrolled for NUCL350 in Fall 2023. Release of course material to any other people without obtaining written permission from the instructor will be regarded as a violation of academic integrity.
- Recording and/or photographing of the lectures are not allowed.
- Grade Proportion
  - Exams: 25% each of best three exams out of four exams taken; or 18.75% each if all four exams need to be accounted for.
  - Quizzes: 25%.
  - Extra Credits: Practice problems (a total of up to 3% pts); A team project (2% pts); Attendance in special event & seminars (0.5% pt. ea.)
  - The grade will be partitioned as shown in the Table below:

Final Avg. Score	Grade
$93 \leq$ Avg.	A
$90 \leq$ Avg. < 93	A-
$85 \leq$ Avg. < 90	B+
$80 \leq$ Avg. < 85	B
$75 \leq$ Avg. < 80	C+
$70 \leq$ Avg. < 75	C
$60 \leq$ Avg. < 70	D
Avg. < 60	F

Extenuating circumstances: Exceptions may be considered for exams and homework assignments under some limited extenuating circumstances, such as: official Purdue approved activities; military obligations; religious observances; government duties; personal reasons beyond his/her control etc. In such cases, students are required to provide the instructor with proof of evidence prior to the expected absences. For the official university policy, refer to: https://www.purdue.edu/advocacy/students/absences.html

Academic Integrity: Academic misconduct of any kind will not be tolerated in any course offered by the School of Nuclear Engineering. Information on Purdue's policies with regard to academic misconduct can be found at https://www.purdue.edu/purdue/about/integrity_statement.php You should familiarize yourself with these policies, particularly if you are new to US academic institutions. All apparent violations of these policies will be referred to the Office of the Dean of Students (ODOS).

Emergency Preparedness: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Students may consult the class BrightSpace or e-mail the instructor to obtain information about changes in the course.

Non-discrimination Policy: Purdue University's non-discrimination policy will be upheld in this classroom. Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. More information can be found at http://www.purdue.edu/purdue/ea_eou_statement.html