EMAE 371/471 Computational Fluid Dynamics (3 credits) Syllabus

Class Time: Thursday 4:00PM – 6:30PM

Class Location: Glennan 408

Instructor: Professor Ya-Ting Liao; yating.liao@case.edu; (216) 368-0048; Glennan 619.

Teaching Assistant: Byoungchul Kwon; bxk287@case.edu; Glennan 114

Office Hours: TBD

Course Description: This course will provide a brief introduction to partial differential equations, governing equations of fluid dynamics and heat transfer, basics of time and space discretization methods, numerical methods of selected model equations, and applications of Computational Fluid Dynamics (CFD) to engineering problems. Students will also have the opportunity to learn and use CFD software (e.g. Fluent, Star-CCM+). The curriculum for graduate and undergraduate level courses (EMAE471 and EMAE371 respectively) will be the same. However, graduate-level students are expected to demonstrate comprehensive understanding of the course materials and the ability to apply the knowledge in research problems. Hence, students who register in the graduate level course (EMAE471) will be assigned additional advanced homework problems and a special project.

Reference Textbooks:


Prerequisite: Fundamentals of Thermal Fluids (e.g. EMAE325).

Grading Policy:

Class Participation (10 points)
Students are expected to attend the class regularly. Participations in the lectures are encouraged. Up to 10 points will be given to the students who actively participate in classroom discussions.

Assignments (50 points)
Homework assignments will be given every week. Each assignment will be weighted equally and sum up to 40 points. While team studying is encouraged, all submitted work must be generated individually. The solutions should be prepared on letter-sized paper in clear, legible writing or typing. The solutions should be submitted before or during the class. Late homework will not be accepted. Additional advanced homework problems will be assigned to students who register in EMAE471. These problems may include writing computer code, implementing User-Defined-Functions in CFD software, etc.

Special Project (30 points) (EMAE471 students only)
A special project will be assigned to students who register in EMAE471. The project will involve building a computer program to solve a CFD problem. Students can choose any computer languages to accomplish the project. The special project will be worth 30 points.
Final Projects (40 points)
A Fluent project will be assigned in the beginning of the semester. Each student will make two oral presentations regarding the project in front of the class, one in the middle and one at the end of the semester. Each student will also submit a final project report after the second presentation. The project will be worth 30 points.

For students who register in EMAE371, the total points should be 100 points. For students who register in EMAE471, the total points should be 130 points.

Ethics Statement: Students will be expected and required to follow the Case Western Academic Integrity Policy (https://students.case.edu/community/conduct/aiboard/policy.html). Discussion among students for homeworks and projects are encouraged as a method of collaborative teaching and learning. However, students are expected to turn in their own work and not a copy of another’s work. Violations will be handled according to the university policy. Collaboration during exams is strictly prohibited.

Communications: Course documents, homework assignments, and all grades will be posted on the course Canvas. (https://canvas.case.edu/).