

1. *Course number and name*
MEE 462: Fluid Mechanics II
2. *Credits and contact hours*
3 credits; 3 hours per week
3. *Instructor's or course coordinator's name*
Course coordinator: Xudong Zheng, Associate Professor, Mechanical Engineering
4. *Text book, title, author, and year*
F.M. White, *Fluid Mechanics*, 8th Edition, McGraw-Hill Education, 2015.
 - a. *other supplemental materials*
None
5. *Specific course information*
 - a. *brief description of the content of the course (catalog description)*
A continuation of MEE 360 including boundary-layer flows, inviscid incompressible flows, compressible flows and selected topics.
 - b. *prerequisites or co-requisites*
Prerequisite: MEE 360
 - c. *indicate whether a required, elective, or selected elective course in the program*
Technical elective for Mechanical Engineering
6. *Specific goals for the course*
 - a. *specific outcomes of instruction.*
By the end of this course, students will demonstrate an ability to:
 - The student will demonstrate an understanding of fluid kinematics (ABET Student Outcomes a, e).
 - The student will demonstrate an understanding of ideal fluid flow (ABET Student Outcomes a, e).
 - The student will demonstrate an understanding of basic viscous flows (ABET Student Outcomes a, e).
 - The student will demonstrate an understanding of laminar and turbulent boundary layers (ABET Student Outcomes a, e).
 - The student will demonstrate an understanding of momentum-integral methods (ABET Student Outcomes a, e).
 - The student will demonstrate an understanding of adiabatic and isentropic compressible flow (ABET Student Outcomes a, e).
 - The student will demonstrate an understanding of normal shock waves (ABET Student Outcomes a, e).

- The student will demonstrate an understanding of converging and diverging nozzles (ABET Student Outcomes a, e).
- The student will demonstrate an understanding of duct flow with friction or heat transfer (ABET Student Outcomes a, e).

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Course addresses ABET Student Outcomes: [a] an ability to apply knowledge of mathematics, science, and engineering, [e] an ability to identify, formulate, and solve engineering problems.

7. *Brief list of topics to be covered*

- Review of the kinematics of the flow field.
- The differential equations for conservation of mass, momentum and energy.
- The stream function, vorticity and irrotationality.
- Simple viscous flow fields.
- The boundary layer equations and the laminar flat plate boundary layer.
- Momentum-integral estimates.
- The turbulent boundary layer.
- Boundary layers with pressure gradient.
- Experimental external flows.
- Review of Thermodynamics and the speed of sound.
- Compressible adiabatic and isentropic steady flow.
- Isentropic flow with area change.
- The normal shock wave.
- Converging and diverging nozzles.
- Compressible duct flow with friction.
- Frictionless duct flow with heat transfer.