

1. *Course number and name*

**ENGR 466: Gas Dynamics and Boundary Layer Flow**

2. *Credits and contact hours*

3 Credit Hours

3. *Instructor's or course coordinator's name*

Instructor: Dr. Ahmad Ganji, Professor of Mechanical Engineering

Course coordinator: Ahmad. R. Ganji, Professor of Mechanical Engineering

4. *Text book, title, author, and year*

Philip J. Pritchard, "Fox and McDonald's Introduction to Fluid Mechanics" 8th Ed. John Wiley, 2011.

a. *other supplemental materials*

F. M. White. *Fluid Mechanics*. McGraw Hill, any Edition.

5. *Specific course information*

a. *brief description of the content of the course (catalog description)*

Review of the fundamentals of fluid dynamics; formulation and application of compressible fluid flow; shock waves. Concept and formulation of laminar and turbulent boundary layers; external flows; and flow around immersed bodies.

b. *prerequisites or co-requisites*

ENGR 304

c. *indicate whether a required, elective, or selected elective course in the program*

Elective for Mechanical Engineering.

6. *Specific goals for the course*

a. *specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*

- Students will demonstrate the ability to apply basic conservation principles to fluid systems.
- Students will demonstrate the ability to apply the basic concepts and principles of one dimensional compressible fluid flow to engineering systems.
- Students will demonstrate an understanding of the concept of B.L., and apply their knowledge to solve basic related fluid flow problems.

- Students will demonstrate the ability to distinguish between laminar and turbulent B.L. and apply the proper relations to solve simple problems.
- Students will demonstrate an understanding of lift and drag forces on immersed bodies, and how to calculate these forces.
- The student will demonstrate basic understanding and knowledge of turbomachinery systems and able to select proper size pumps to match with system's performance

*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 Outcome(s): a, c, e

7. *Brief list of topics to be covered*

- Review of basic principles of fluid mechanics
- Introduction to compressible fluid flow
- Steady one-dimensional compressible flow
- Viscous Flow Over Surfaces
- Boundary layers
- Flow about immersed bodies
- Introduction to Turbomachinery