

Unified — Fluid Dynamics

Scope

The fluids material in UE is begun at an introductory level, and assumes that most students will not have had a previous course in fluid dynamics at the university sophomore level. A few of the most important topics will be taken to a moderately advanced level, reflecting the fact that many of the UE students will not take another course in fluid dynamics during their MIT undergraduate program.

Learning Objectives – Students in Unified will learn to:

- Explain the physical properties of a fluid and their consequence on fluid flow, expressed in terms of Mach and Reynolds numbers
- Understand the conservation principles of mass, momentum, and energy for fluid flow
- Apply the basic applied-mathematical tools that support fluid dynamics
- Create conceptual and quantitative models of inviscid, steady fluid flow over simple bodies (airfoils, wings) and in channels

Measurable Outcomes – Students graduating from Unified will be able to:

- Explain the basic concepts of aerodynamics to a high-school senior or non-technical person
- Apply the conservation principles of mass, momentum, and energy to fluid flow systems with emphasis on aerodynamics
- Model inviscid, steady fluid flow over simple aerodynamic shapes, and compute or estimate the associated forces and moments

Assessment Strategy

- Students' self-assessment of understanding the course material, relative to the learning objectives
- Retain copies of A, B, and C level performances on written assignments and quizzes