



Introduction to Turbulence

AEROENG 7875

Credit Hours:

3.00 - 3.00

Course Levels:

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

Introduction to turbulence in fluid mechanics with emphasis on understanding the physical mechanisms involved.

Prerequisites and Co-requisites:

Prereq: Grad standing in Mechanical or Aerospace Engineering, or permission of instructor.

Course Goals / Objectives:

- Understand the physical mechanisms of turbulence generation.
- Develop the tools for the description of turbulent flows.
- Develop the theoretical framework for applying the understanding of turbulent flows to modelling.

Course Topics:

- Introduction. Definition of turbulence, non-dimensional variables, scales.
- Governing equations, statistical tools, correlations, spectra.
- Homogeneous turbulence, isotropy, scale interactions, implications for more complex flows.
- Boundary layers. Laminar, transitional, turbulent, scaling, stability, turbulent production, coherent structures, mixing length hypothesis, conditional averages; theoretical, computational and experimental results.
- Free shear flows. Mixing layers, jets; scaling laws, experimental results, theoretical models.
- Wakes. Scaling laws, experimental results, theoretical models.

Designation:

Elective