

ME 682 *Turbulence*

2nd semester 1436/1437

Instructor: Khaled S. Al-Salem
Office: 2C52
Tel.: 4676346
kalsalem@ksu.edu.sa

Schedule: 2 sessions per week; 1.5hrs per session.

Text: *Turbulent Flows*, Stephen B. Pope, Cambridge University Press, 2000.

References: *A First Course In Turbulence*, H. Tennekes and J. L. Lumley, The MIT Press, 1972.
Boundary-Layer Theory, H. Schlichting and K. Gersten, Springer, 2003.
Turbulence Modeling For CFD, Davi C. Wilcox, DCW Industries, 2000.

Prerequisites: Advanced course in fluid mechanics and advanced mathematics.

Course Introduction: The majority of flows in industry and in nature are turbulent. However, during your studies of fluid mechanics the subject of turbulence has been briefly discussed as not to distract away from the deterministic description of fluid motion. In this course, you will combine the knowledge you already acquired of fluid mechanics with statistical description of fluid motion to develop an understanding of turbulence. You will also learn ways to deal with turbulent flows through different modeling strategies.

Course Content:

- Fundamental concepts; index notation.
- Equations of fluid motion.
- Statistical description of turbulent flows.
- Free-shear flows.
- Wall-bounded flows.
- The scale of turbulent motion.
- Modelin of turbulent flows:
 - Turbulent viscosity models
 - Reynolds stress models
 - Direct Numerical Simulation
 - Large Eddy Simulation

Grading:

Problems	50%
Mid-term	20%
Final	30%