457.561 Fluid Dynamics

Instructor: Seo, Il Won

Department of Civil and Environmental Engineering

Tel: +82-2-880-7345; e-mail: seoilwon@snu.ac.kr; Web: ehlab.snu.ac.kr

Description:

This course deals with the physical concepts and fundamental equations of fluid dynamics in the advanced level. In the beginning of this course, the similarity of the fluid transport phenomena and stress-strain relations are discussed. Main part of this course will be focused on three dimensional expressions of equations of continuity and motion for viscous fluids. Specific topics and applications in fluid dynamics are also treated. In the latter part of the course, dynamics of turbulent flow, turbulent boundary layer theory, and turbulence modeling are studied in detail.

Text:

1. Seo, I.W., Lecture Note of Fluid Dynamics, Seoul National University, 2019, Web:

ehlab.snu.ac.kr

Reference:

1. Daily, J.W. and Harleman, D.R.F., Fluid Dynamics, Addison-Wesley, 1966.

2. Currie, I.G., Fundamental mechanics of Fluids, 3rd Ed., Marcel Dekker, Inc., 2003.

3. Kundu, P.K., Cohen, I.M., and Dowling, D.R., Fluid Mechanics, 5th Ed., Academic Press, 2012.

4. Welty, J.R., Wicks, C.E., and Wilson, R.E., Fundamentals of Momentum, Heat, and mass Transfer, 3rd Ed., John Wiley & Sons, 1984.

5. Tennekes, H. and Lumley, J.L., A First Course in Turbulence, MIT Press, 1972.

6. Hinze, J.O., Turbulence, McGraw-Hill, 1975.

7. Rodi, W., Turbulence Models and Their Applications in Hydraulics, IAHR Monograph, A.A. Balkema, 1993.

Prerequisites:

Elementary Fluid Mechanics and Lab.

Hydraulics and Lab.

Contents:

0. Introduction

1. Fluid Characteristics

2. Kinematics

3. Fluid Transport

4. Continuity, Energy, and Momentum Equations

5. Stress-Strain Relations

6. Equations of Continuity and Motion

7. Some Special Equations

8. Origin of Turbulence

9. Wall Turbulence

10. Turbulence Modeling

Grade:

Homework Assignments	30%
Term Project	30%
Final Exam.	40%