DEPARTMENT OF MATHEMATICS,

UNIVERSITY OF KARACHI,

Course Outline

MATH 656: FLUID DYNAMICS – II (2 + 1)

Course contents:

Integral form of conservational equations (mass, momentum and energy) and applications. Open Channel flow: General characteristics of Open Channel flow, surface waves, specific energy, channel depth variation, the Chezy and Manning equations and their applications. Gradually Varied flow, rapidly varied flow, the hydraulic Jump, Sharp-Crested wires, Broad- crested weirs, Underflow Gates. Compressible flow: ideal gases and ideal gas relationships, Mach number, Speed of Sound, categories of Compressible flow, isentropic flow of an ideal gas through converging, diverging and converging-diverging ducts.

Labs:

Designing of open channels(at least three) and ducts (at least two) using available software(s)

Books Recommended:

1. Munson, B. R., Young, D. F and Okiishi, T. H., Fundamentals of Fluid Mechanics, Fifth Edition, John Wiley Sons, N. Y., 2005.

2. Panton, R. L., Incompressible Flows, John Wiley and Sons, N.Y., 2005.

3. Batchelor, G. K., An Introduction to Fluid Dynamics, Cambridge University Press, 2008.

4. Cengel, Y. A. and Cimbala, J. M., Fluid Mechanics: Fundamentals and Applications, McGraw- Hill, Higher Education, 2008.

5. Thompson, P. A., Compressible Fluid Dynamics, McGraw - Hill, 1972

6. O' Neill, M. E. and Cholton, F., Ideals and Incompressible Fluid Dynamics, Ellis Horwood Ltd, West Sussex, England, 1986.

7. Bansal, J. H., Viscous Fluid Dynamics, Oxford and IBH Publishers Co, New Delhi, 2000.

8. Acheson, D. J., Elementary Fluid Dynamics, Clarendon Press, Oxford, 1990.

9. Kuethe, A. M. and Chow, C.Y., Foundation of Aerodynamics, John Wiley and Sons, N.Y., 1986.

10. Shivamaggi, K. B., Theoretical Fluid Dynamics, Princeton Hall, New Dehli, 1998.

11. Cengel, Y. A., Thermodynamics An Engineering Approach, Fifth Edition, McGraw Hill Higher Education, 2006.

12. Crowe, C. T., Elger, D. F. and Roberson J. R., Engineering Fluid Mechanics, Seventh Edition, John Wiley and Sons, Inc, 2001.

13. Finnemore, E. J., and Franzini, J. B., Fluid Mechanics with Engineering Applications, Tenth Edition, McGraw Hill, New York, 2002.

14. Cengel, Y. A., Heat and Mass Transfer. Third Edition, McGraw Hill, New York, 2007.