

## CIVIL 332 –FLUID MECHANICS 2 (10 Points, SC 2015)

**COURSE CO-ORDINATOR:** Dr. Heide Friedrich (Room 1.705, ext. 86912)

**TIMES:** check with <http://www.studentservices.auckland.ac.nz/uoa/>

### PHILOSOPHY & PURPOSE:

To provide an understanding of the principles of the mathematical framework for describing fluid motion, emphasizing applications to natural systems and the environment.

- Develop the equations of motion governing fluid flow.
- Explore solutions to simplified versions of these equations.
- Develop an intuitive physical understanding of fluid motion.
- Apply this knowledge to water flows in the environment.
- Show implications for biological systems and ecosystem dynamics.



### LABORATORIES:

The topics covered in the laboratory sessions are:

- Laminar and turbulent flows;
- Velocity distribution in a pipe; and
- Drag on a cylinder.

Each laboratory session is of two hours duration. Students have to attend all three laboratories at the scheduled times. Laboratory attendance will be recorded and laboratories will only be signed off within the scheduled laboratory periods.

<b>ASSESSMENT:</b>	65%	2 hr exam
	25%	50 min test
	5 %	capturing motion photography assignment
	5%	laboratories (1,1,3)

### COURSE OUTLINE:

1. *Fluid properties, conservation and flow equations.* Review of the fundamental differences between ideal and real fluids.
2. *Introduction to turbulence, boundary layers and drag and lift phenomena.* Shows how to simplify the analysis and calculation of flow phenomena and interaction with solid boundaries.
3. *Laminar and turbulent velocity distribution.* Derive equations to characterize flow fields.
4. *Fluid flow modelling.* Introduction to CFD (Computational Fluid Dynamics) and other hydraulic modelling.
5. *Exchange processes and sediment transport.* Mixing processes at air-water and sediment-water interfaces.
6. *Environmental transport processes.* Introduction to diffusion and dispersion and how to apply in an ecosystem.

### TEXTS:

There are no prescribed textbooks with the notes and tutorials being sufficient for the course. Background material used in designing the course will be commented on within the course.