**CIVL 530: Open Channel Hydraulics (3 Credits)**

This course focuses on the principles of open channel flow, computer simulations and applications, design and environmental problems, culvert hydraulics, as well as on the analysis of critical, uniform, gradually-varied and rapidly-varied flows. *(Prerequisite: CIVL 444)*

**Course Learning Outcomes:**

By the end of the course, students will be able to:

A1. Identify, formulate and solve complex civil engineering problems by applying principles of engineering, science and mathematics.

A2. Acquire and apply new knowledge as needed, using appropriate learning strategies.

A3. Apply engineering to produce solutions that meet specified needs but always with care and consideration for public health, safety and welfare, as well as for global, cultural, social, environmental and economic factors.

B4. Apply mathematical principles for the analysis of free surface flow problems using friction, energy and momentum considerations.

B1. Develop and conduct appropriate experimentation, analyze and interpret data, and use scientific judgment to draw conclusions.

B2. Accept and integrate new ideas and information on their merits, even if contrary to opinion or previous experiences.

B3. Demonstrate a detailed knowledge of the principles controlling open channel flows.

B4. Summarize the differences between flow types and controlling features in open channel flows.

**Course Learning Materials:**

* + Chow V.T., Open-Channel Hydraulics, The Blackburn Press.
	+ Chanson H., Hydraulics of Open Channel Flow, Butterworth-Heinemann.
	+ Chaudhry M.H., Open-Channel Flow, Springer.

**Course Content:**

1. Conservation Laws
2. Critical Flow
3. Uniform Flow
4. Gradually Varied Flow
5. Computation of Gradually Varied Flow
6. Rapidly Varied Flow
7. Computation of Rapidly Varied Flow
8. Channel Design
9. Special Topics
10. Unsteady Flow
11. Governing Equations for One-Dimensional Flow
12. Numerical Methods
13. Finite-Difference Methods
14. Two-Dimensional Flow
15. Sediment Transport