

**VILLANOVA UNIVERSITY  
WATER RESOURCES AND ENVIRONMENTAL  
ENGINEERING GRADUATE PROGRAM**

**Evening Course**

**in**

**Open Channel Hydraulics**

**C.E.E. 8503**

**Offered – Odd Years –Fall\***

***(Available through Real Time Distance Education)***



- Given a 100 year flood could you calculate the water surface profile using a spreadsheet or computer program?
- Could you find the changes in water depth due to the addition of a stream crossing? Is it possible to reduce the channel area and have the water surface drop?
- You find the flow splits as it travels through your site, how do you model it?
- You have a complex urban stream channel with multiple stream crossings, culverts and low flow weirs, can you model it for both low and high flows?
- How do I find the velocity in the left overbank?
- How accurate is HEC-RAS, and what do the errors mean?
- Given a stream channel with an abrupt change in bed slope from steep to mild, a hydraulic jump could occur either up or downstream of the break in grade. Could you find the exact jump location? Will this impact the channel?
- Can I use HEC-RAS with GIS?

**COURSE DESCRIPTION:**

Analysis of free surface flow. Topics include water surface profiles in artificial and natural channels, bends, gradual and abrupt transitions, obstructions, stilling basins and energy dissipaters, flow around obstructions, bridge openings, design criteria, and mathematical models. The latest available version of the Corps of Engineers River Analysis Software HEC-RAS will be used during the course.

**PREREQUISITE:** C.E.E. 7111 *Introduction to Hydraulic Engineering and Hydrology*, or UG equivalent.

**INSTRUCTOR:** Dr. Robert G. Traver, PE  
Associate Professor of Civil Engineering  
610.519.7899 robert.traver@villanova.edu

Prospective students may contact the instructor or the Department of Civil and Environmental Engineering at 610-519-4960.

Further information on all of the Department's graduate programs is available at:

<http://www.engineering.villanova.edu/ce/>

Updated Summer 2003

\*Instructor/Course Offerings are subject to change.