

CEE 618 – Spring 2009

Environmental Fluid Mechanics

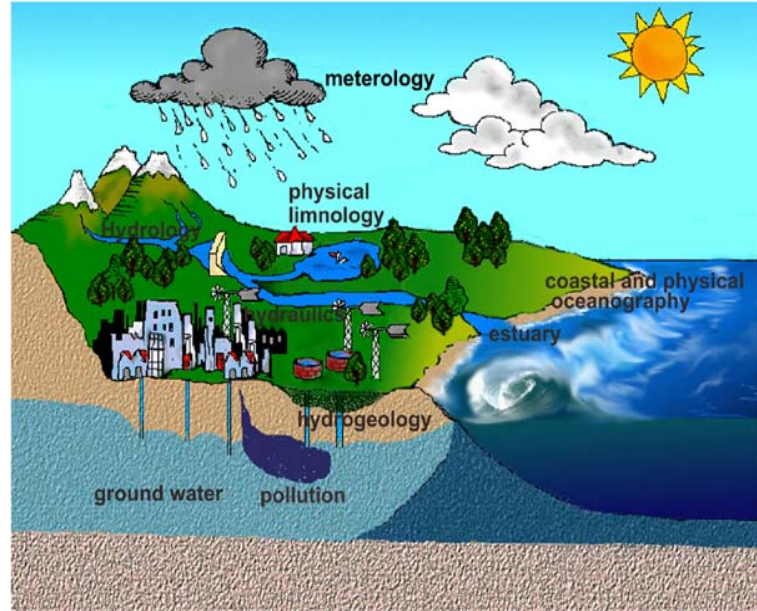
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Course Website: <http://www.engr.wisc.edu/cee/courses/cee618.html>

Course description:

This course will introduce a wide range of mixing and transport in the hydrosphere, such as porous media flows, surface/internal waves, open channel flows, surface runoff, mud flows, flight of insects, and turtle swimming, ... etc. In this class physical intuition for understanding the environment flows is greatly emphasized. Both analytical techniques and numerical methods (modeling tools) will be introduced to further elucidate transport and mixing phenomena. The goal of this course is to provide systematic analysis tools and basic research skills for study of fluid mechanics in natural and constructed environments.



Outlines:

- I. Overview of environmental fluid mechanics
- II. Review of fluid kinematics and conservation laws
- III. Dimensional analysis (Buckingham Pi theorem, scaling analysis)
- IV. Potential flow (porous media flows, surface/internal waves in oceans and lakes)
- V. Laminar flow (channel and overland flow, mud flow, transient and oscillatory boundary layer, induced streaming, mass transport)
- VI. Turbulent flow (instability, characteristics, averaging, Reynolds and turbulent kinetic eqns, applications: effluent discharge, boundary layer)

Course Prerequisites:

CEE 310 (fluid mechanics), Math 319 (basic calculus, some differential equations)

Lectures:

MW, 11:00 a.m. ~ 12:30 p.m., 2265 Engineering Hall

Grading:

Homework 50%, Final Project/Exam: 50%

Text

- 4th Edition, Fluid Mechanics, Pijush K. Kundu and Ira M Cohen, Academic Press, Inc. 2008.
- Handouts