

**CE 593C/493B**

**Environmental Hydraulic Engineering**

**Fall 2018**

**Instructor:** Seung Ho Hong, 531 ESB, email:sehong@mail.wvu.edu,

**Office Hours:** M 11:00 -11:50 am, W 11:00-11:50 am, or by appointment.

**Prerequisite:** CE 321 Fluid Mechanics or equivalent.

**Required Text:** No required text.

**Homework:** Homework problems will be assigned after finishing important concept and collected in 1 week during the class hours. Late homework (up to the next day at 5 pm) will receive ½ credit. You may work in groups, but independent homework solutions must be turned in. Your graded assignments will be returned within a week of the date of submission. THIS IS AN IMPORTANT COURSE POLICY.

**Exams:** There will be two mid-semester exams and a final. All exams are closed book, however one page (8-1/2 by 11) (Single side) of equations is allowed. All exams are mandatory. There is no substitution to exams. If you have had any emergency, contact me immediately. You can use calculators, but use of cell phones, computers, and any other equipment with wireless connection is prohibited.

**Grade:** Your final grade will be based on graded homework problems (20%), two mid-semester exams (25% each), and final exam (30%).

**Honor code:**

1. Plagiarizing is defined by Webster's dictionary as "to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source." If caught plagiarizing, you will be dealt with according to the WVU Academic Honor Code.

2. When working on homework, you may work with other students in the class. However, you must turn in separate versions of the homework with the following written on it: your name and the names of everyone you collaborated with.

3. Cheating off of another person's test is unethical and unacceptable. Cheating off of anyone else's work is a direct violation of the WVU Academic Honor Code, and will be dealt with accordingly.

4. Unauthorized use of any previous semester course materials, such as tests, homework, and any other coursework, other than that provided by the instructor, is prohibited in this course. Using these materials will be considered a direct violation of academic policy and will be dealt with according to the WVU Academic Honor Code.

## **COURSE TOPICS:**

### **1. Introduction**

Typical environmental problems; course overview; dimensional analysis.

### **2. Diffusion and Dispersion**

Basic ideas of mass transport and mixing. The advective-diffusion equation and basic solutions. Mixing in turbulent and shear flows.

### **3. Rivers**

Vertical, transverse, and longitudinal mixing in ideal and real rivers. Estimation of diffusion coefficients. Use of tracers to measure flow and velocity. Thermal dispersion.

### **4. Lakes and Reservoirs**

The annual cycle. Effect of stratification. Surface heat transfer. Dynamics of vertical and horizontal mixing.

### **5. Estuaries and Coastal Waters**

Circulation and tides. Causes of mixing. Salinity intrusion.

### **6. Mixing Zone Analyses**

Concept of a mixing zone. Introduction to jets, plumes and diffusers. Regulatory requirements.