Subject: Hydraulics

Course number：DMP2810E
Instructor：Prof. Guangwei HUANG
Term / Time：Fall through Winter

1. Course Description
Analysis of open channel flows and the characterization of flood wave propagation with step-by-step explanation of related computational techniques. Laboratory flume experiment and on-site training will help students better understand the theories and its applications.

Course Goal:
To enable students to conduct professional channel flow analysis and applications and to develop independent learning and problem solving skills. After completing this course, you will be able to…
   1. set up systems of equations representing flow through channel systems
   2. perform 1-D steady and unsteady flow analysis of open channel systems
   3. apply solution approaches to levee design
   4. conduct flow discharge measurement
   5. present technical information effectively

2. Course Outline (Course Topics)
   I.   Basic principles of open channel flows
   ● Mathematics for Hydraulics
   ● Introduction & Fundamental equations
   ● Flow resistance in open channel
   ● Flow resistance calculation in engineering practice
   ● Basics of water surface profiles of open channel flow
   ● Basics of flood wave

   II.   Experimental study
   ● Experimental study about flow resistance and varied flows

   III.   Detailed tutorials on open channel flows
   ● Systematic classification of water surface profiles
   ● Numerical solution of the gradually-varied flow equation
   ● Hydraulic jump and its application
   ● Unsteady flow models
   ● Preissmann scheme for unsteady flow
   ● Explicit Forward-Time-Centre-Space scheme for unsteady flow
   ● Channel design

IV.   Flow measurement
- Different types of flow measurements
- On site measurement of flow measurement

Final exam

3. Grading:
   Class participation (30%), Quiz and exercise (30%), Examination (40%)

4. Reference books
   Open-channel Hydraulics, Ven Te Chow;
   Practical aspects of computational river hydraulics, J.A. Cunge, F.M. Holly, Jr., A. Verwey.
   Fluid Mechanics and Hydraulics, R. V. Giles, J. B. Evett, and C. Lin.

   Handouts will be distributed.